Dell™ Dimension™ E521 Service Manual

Model DCSM

Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

About Your Computer
Dell™ Dimension™ E521 Service Manual

● Front View of the Computer

● Back View of the Computer

● Back Panel Connectors

Front View of the Computer

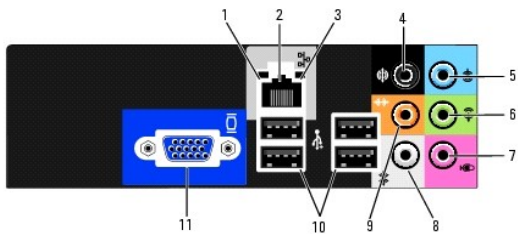| 1	cover latch release	Use this latch to remove the cover. See Removing the Computer Cover.
2	location of Service Tag	Use the Service Tag to identify your computer when you access the Dell Support website or call technical support.
3	CD or DVD eject button	Press to eject a disk from the CD or DVD drive.
4	CD or DVD activity light	The drive light is on when the computer reads data from the CD or DVD drive.
5	FlexBay drive	Can contain an optional floppy drive or optional Media Card Reader. For information on using the Media Card Reader, see "Using a Media Card Reader (Optional) in your Owner's Manual.
6	microphone connector	Use the microphone connector to attach a personal computer microphone for voice or musical input into a sound or telephony program. On computers with a sound card, the microphone connector is on the card.
7	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
8	LAN indicator light	This light indicates that a LAN (local area network) connection is established.
9	diagnostic lights (4)	Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see Diagnostic Lights.
10	hard-drive activity light	The hard-drive activity light is on when the computer reads data from or writes data to the hard drive. The light might also be on when a device such as a CD player is operating.
11	power button, power light	Press the power button to turn on the computer. The light in the center of this button indicates power state. **NOTICE:** To avoid losing data, do not use the power button to turn off the computer. Instead, perform an operating system shutdown.
12	USB 2.0 connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see System Setup Options for more information on booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
13	vents	For adequate cooling, do not block any of the vents.

| | | **NOTICE:** Ensure that there is a minimum of two inches of space between all vents and any object near these vents. |
| | | **NOTICE:** Keep the vent area clean and dust-free to ensure that the computer is adequately ventilated. Use only a dry cloth to clean the vent area to avoid water damage to the computer. |

Back View of the Computer
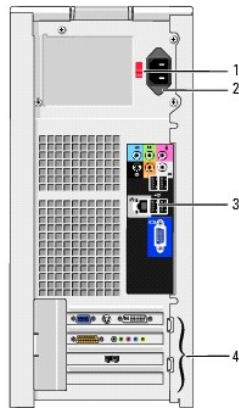
1	voltage selection switch	See the safety instructions in the *Product Information Guide* for more information.
2	power connector	Insert the power cable.
3	back panel connectors	Plug USB, audio, and other devices into the appropriate connector. See Back Panel Connectors for more information.
4	card slots	Access connectors for any installed PCI and PCI Express cards.

Back Panel Connectors

1	link integrity light	l Green — A good connection exists between a 10-Mbps network and the computer. l Orange — A good connection exists between a 100-Mbps network and the computer. l Off — The computer is not detecting a physical connection to the network.
2	network adapter connector	To attach your computer to a network or broadband device, connect one end of a network cable to either a network port or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **NOTE:** Do not plug a telephone cable into the network connector. On computers with a network connector card, use the connector on the card. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the

		network speed to 10 Mbps to ensure reliable operation.
3	network activity light	Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
4	surround connector	Use the black surround connector to attach multichannel-capable speakers.
5	line-in connector	Use the blue line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR. On computers with a sound card, use the connector on the card.
6	line-out connector	Use the green line-out connector (available on computers with integrated sound) to attach headphones and most speakers with integrated amplifiers. On computers with a sound card, use the connector on the card.
7	microphone	Use the pink connector to attach a personal computer microphone for voice or musical input into a sound or telephony program. On computers with a sound card, the microphone connector is on the card.
8	side surround connector	Use the silver connector to provide enhanced surround audio for computers with 7.1 speakers. On computers with a sound card, the microphone connector is on the card.
9	center/subwoofer connector	Use the yellow connector to attach a speaker to a Low Frequency Effects (LFE) audio channel.
10	USB 2.0 connectors (4)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards. It is recommended that you use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras.
11	VGA video connector	Connect the monitor's VGA cable to the VGA connector on the computer. On computers with a video card, use the connector on the card.

Advanced Troubleshooting
Dell™ Dimension™ E521 Service Manual

- Power Lights
- Diagnostic Lights
- Beep Codes
- System Messages
- Dell Diagnostics
- Drivers
- Resolving Software and Hardware Incompatibilities

Power Lights

⚠️ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is green and the computer is not responding:

  - Ensure the display is connected and powered on.

  - If the display is connected and powered on, see Diagnostic Lights.

- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

- If the power light is off, the computer is either turned off or is not receiving power.

  - Reseat the power cable in the power connector on the back of the computer and the electrical outlet.

  - If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on. Also, bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.

  - Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

  - Ensure that the main power cable and front panel cable are securely connected to the system board (see System Board Components).

- If the power light is blinking amber, the computer is receiving electrical power, but an internal power problem might exist.

  - Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).

- If the power light is steady amber, a device might be malfunctioning or incorrectly installed.

  - Remove and then reinstall the memory modules (see Memory).

  - Remove and then reinstall any cards (see Cards).

  - Remove and then reinstall the graphics card, if applicable (see Cards).

  - Ensure that all power cables are securely connected to the system board (see System Board Components).

Diagnostic Lights

⚠️ **CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

To help you troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the front panel (see Front View of the Computer). When the computer starts normally, the lights flash before turning off. If the computer malfunctions, the sequence of the lights helps to identify the problem.

Light Pattern	Problem Description	Suggested Resolution
①②③④	The computer is in a normal "off" condition, or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the computer successfully boots to the operating system.	Plug the computer into a working electrical outlet and press the power button.
①②③④	A possible BIOS failure has occurred; the computer is in the recovery mode.	Run the BIOS Recovery utility, wait for recovery completion, and then restart the computer.
①②③④	A possible processor failure has occurred.	Contact Dell (see "Contacting Dell" in your *Owner's Manual*).

Diagnostic Lights	Description	Suggested Resolution
① ② ③ ④ (3, 4 green)	Memory modules are detected, but a memory failure has occurred.	l If you have two or more memory modules installed, remove the modules, reinstall one module (see Installing Memory), and then restart the computer. If the computer starts normally, reinstall an additional module. Continue until you have identified a faulty module or reinstalled all modules without error. l If available, install properly working memory of the same type into your computer (see Installing Memory). l If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
① ② ③ ④ (2, 4 green)	A possible graphics card failure has occurred.	l If the computer has a graphics card, remove the card, reinstall it (see PCI Express Cards), and then restart the computer. l If the problem still exists, install a graphics card that you know works and restart the computer. l If the problem persists or the computer has integrated graphics, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
① ② ③ ④ (2, 3 green)	A possible floppy or hard drive failure has occurred.	Reseat all power and data cables and restart the computer.
① ② ③ ④ (2 green)	A possible USB failure has occurred.	Reinstall all USB devices, check cable connections, and then restart the computer.
① ② ③ ④ (1 green)	No memory modules are detected.	l If you have two or more memory modules installed, remove the modules, reinstall one module (see Installing Memory), and then restart the computer. If the computer starts normally, reinstall an additional module. Continue until you have identified a faulty module or reinstalled all modules without error. l If available, install properly working memory of the same type into your computer (see Installing Memory). l If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
① ② ③ ④ (1, 4 green)	Memory modules are detected, but a memory configuration or compatibility error exists.	l Ensure that no special memory module/memory connector placement requirements exist (see Memory Installation Guidelines). l Verify that the memory modules that you are installing are compatible with your computer (see Memory Installation Guidelines). l If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
① ② ③ ④ (1, 2, 3 green)	Another failure has occurred.	l Ensure that the cables are properly connected to the system board from the hard drive, CD drive, and DVD drive (see Drives). l If there is an error message on your screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to ensure that it is functioning properly. l If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
① ② ③ ④ (all green)	After POST is complete, all four diagnostic lights turn green briefly before turning off to indicate normal operating condition.	None.

Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. One possible beep code consists of one long beep and then two short beeps. This beep code tells you that the computer encountered a memory test failure.

If your computer beeps during start-up:

1. Write down the beep code.

2. Run the Dell Diagnostics to identify a more serious cause (see Dell Diagnostics).

Code	Cause
2 short, 1 long	BIOS checksum error
1 long, 2 short	Memory test failure (bad memory during memory sizing)
1 long, 3 short, 2 short	No memory
1 short	F12 key pressed

System Messages

NOTE: If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

A filename cannot contain any of the following characters: \ / : * ? " < > | — Do not use these characters in filenames.

A required .DLL file was not found — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

1. Click the **Start** button, click **Control Panel**, and then click **Add or Remove Programs**.
2. Select the program you want to remove.
3. Click the **Change or Remove Program** icon.
4. See the program documentation for installation instructions.

Attachment failed to respond — See "Drive Problems" in your *Owner's Manual*.

Bad command or file name — Ensure that you spelled the command correctly, put spaces in the proper place, and used the correct pathname.

Bad error-correction code (ECC) on disk read — See "Drive Problems" in your *Owner's Manual*.

Data error — See "Drive Problems" in your *Owner's Manual*.

Diskette drive 0 seek failure — See "Drive Problems" in your *Owner's Manual*.

Diskette read failure —

See "Drive Problems" in your *Owner's Manual*.

Diskette write protected — Slide the write-protect notch on the floppy disk to the open position.

Hard-disk drive failure —

See "Drive Problems" in your *Owner's Manual*.

No boot device detected — Insert a bootable floppy disk or CD.

Invalid configuration information - please run SETUP program — Enter system setup and correct the computer configuration information (see Entering System Setup).

Keyboard failure — See "Keyboard Problems" in your *Owner's Manual*.

Memory allocation error —

1. Turn off the computer, wait 30 seconds, and then restart the computer.
2. Try to run the program again.
3. If the error message appears again, see the software documentation for additional troubleshooting suggestions.

No boot device available —

l   If the floppy drive is your boot device, ensure that a bootable floppy disk is in the drive.
l   If the hard drive is your boot device, ensure that the cables are connected and that the drive is installed properly and partitioned as a boot device.
l   Enter system setup and ensure that the boot sequence information is correct (see Entering System Setup).

Non-system disk error — Remove the floppy disk from the drive and restart your computer.

Non-system disk or disk error — Replace the floppy disk with one that has a bootable operating system or remove the floppy disk from drive A and restart the computer.

Not a boot diskette — Insert a bootable floppy disk and restart your computer.

Not enough memory or resources. Close some programs and try again — Close all windows and open the program that you want to use. In some cases, you might have to restart your computer to restore computer resources. If so, run the program that you want to use first.

Read fault —

Requested sector not found —

Reset failed —

See "Drive Problems" in your *Owner's Manual*.

Sector not found —

l   Run the Windows error-checking utility to check the file structure on the floppy disk or hard drive. See Windows Help for instructions.
l   If a large number of sectors are defective, back up the data (if possible), and then reformat the floppy disk or hard drive.

Seek error — See "Drive Problems" in your *Owner's Manual*.

Shutdown failure — Run the Dell Diagnostics.

Unexpected interrupt in protected mode — Run the Dell Diagnostics.

WARNING: Dell's Disk Monitoring System has detected that drive [0/1] on the [primary/secondary] EIDE controller is operating outside of normal specifications. It is advisable to immediately back up your data and replace your hard drive by calling your support desk or Dell —

If no replacement drive is immediately available and the drive is not the only bootable drive, enter system setup and change the appropriate drive setting to **None**. Then remove the drive from the computer (see Entering System Setup).

<*drive letter*>:\ is not accessible. The device is not ready — The selected drive cannot read its medium. Depending on its medium type, insert a floppy, CD, or Zip disk into the drive and try again.

Dell Diagnostics

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

📝 **NOTE:** The Dell Diagnostics only operate on Dell computers.

Starting the Dell Diagnostics

1. Turn on (or restart) your computer.

2. When the DELL logo appears, press <F12> immediately.

   📝 **NOTE:** Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the **Boot Device Menu**.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, then shut down your computer and try again.

3. At the **Boot Device Menu**, use the up- and down-arrow keys or press the appropriate number on the keyboard to highlight **Boot to Utility Partition**, and then press <Enter>.

   📝 **NOTE:** The Quickboot feature changes the boot sequence for the current boot only. Upon restart, the computer boots according to the boot sequence specified in system setup.

4. At the Dell Diagnostics **Main Menu**, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see Dell Diagnostics Main Menu).

   📝 **NOTE:** Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

5. After all tests have completed, close the test window to return to the Dell Diagnostics **Main Menu**.

6. Close the **Main Menu** window to exit the Dell Diagnostics and restart the computer.

Dell Diagnostics Main Menu

1. After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

Option	Function
Express Test	Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run **Express Test** first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of devices. This test typically takes an hour or more and requires you to answer questions periodically.
Custom Test	Tests a specific device. You can customize the tests you want to run.
Symptom Tree	Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.

2. If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.

    If you cannot resolve the error condition, contact Dell (see "Contacting Dell" in your *Owner's Manual*).

NOTE: The Service Tag for your computer is located at the top of each test screen. If you contact Dell, technical support will ask for your Service Tag.

3. If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and may indicate requirements for running the test.
Configuration	Displays your hardware configuration for the selected device.
	The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test by changing the test settings.

4. Close the test screen to return to the **Main Menu** screen. To exit the Dell Diagnostics and restart the computer, close the **Main Menu** screen.

Drivers

What Is a Driver?

A driver is a program that controls a device such as a printer, mouse, or keyboard. All devices require a driver program.

A driver acts as a translator between the device and any other programs that use the device. Each device has its own set of specialized commands that only the driver for that device recognizes.

Required drivers are already installed on your computer—no further installation or configuration is needed.

Many drivers, such as the keyboard driver, come with your Microsoft® Windows® operating system. You may need to install drivers if you:

   l   Upgrade your operating system.

   l   Reinstall your operating system.

   l   Connect or install a new device.

Identifying Drivers

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

Windows XP

1. Click the **Start** button, then click **Control Panel**.

2. Under **Pick a Category**, click **Performance and Maintenance**.

3. Click **System**.

4. In the **System Properties** window, click the **Hardware** tab.

5. Click **Device Manager**.

6. Scroll down the list of devices and check for an exclamation point (a circle with a [**!**]) next to the device name.

   If an exclamation point appears next to the device name, you may need to reinstall the driver or install a new driver.

Reinstalling Drivers

NOTICE: The Dell Support website at **support.dell.com** provides approved drivers for your Dell™ computer. If you install drivers obtained from other sources, your computer may not function properly.

Using Windows XP Device Driver Rollback

If a problem occurs on your computer after you install or update a driver, use Windows XP Device Driver Rollback to replace the driver with the previously installed version.

1. Click **Start**, then click **Control Panel**.

2. Under **Pick a Category**, click **Performance and Maintenance**.

3. Click **System**.

4. In the **System Properties** window, click the **Hardware** tab.

5. Click **Device Manager**.

6. Right-click the device for which the new driver was installed, then click **Properties**.

7. Click the **Driver** tab.

8. Click **Roll Back Driver**.

Manually Reinstalling Drivers

1. After copying the required driver files to your hard drive, click the **Start** button and right-click **My Computer**.

2. Click **Properties**.

3. Click the **Hardware** tab and click **Device Manager**.

4. Double-click the type of device for which you are installing the driver.

5. Double-click the name of the device for which you are installing the driver.

6. Click the **Driver** tab and click **Update Driver**.

7. Click **Install from a list or specific location (Advanced)** and click **Next**.

8. Click **Browse** and browse to the location to which you previously extracted the driver files.

9. When the name of the appropriate driver appears, click **Next**.

10. Click **Finish** and restart your computer.

Resolving Software and Hardware Incompatibilities

If a device is not detected during the operating system setup or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.

To resolve incompatibilities using the Hardware Troubleshooter:

1. Click **Start**, then click **Help and Support**.

2. Type `hardware troubleshooter` in the **Search** field, then click the arrow to start the search.

3. Click **Hardware Troubleshooter** in the **Search Results** list.

4. In the **Hardware Troubleshooter** list, click **I need to resolve a hardware conflict on my computer**, and then click **Next**.

Before You Begin

Dell™ Dimension™ E521 Service Manual

- Getting Started
- Recommended Tools
- Turning Off Your Computer
- Before Working Inside Your Computer

Getting Started

This manual provides procedures for removing and replacing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- l   You have performed the steps in Turning Off Your Computer and Before Working Inside Your Computer.

- l   You have read the safety information in your Dell™ *Product Information Guide.*

- l   A component can be installed by performing the removal procedure in reverse order.

Recommended Tools

The procedures in this document may require the following tools:

- l   Small flat-blade screwdriver

- l   Phillips screwdriver

- l   Flash BIOS update program (download)

Turning Off Your Computer

 NOTICE: To avoid losing data, save and close any open files and exit any open programs before you turn off your computer.

1. Shut down the operating system:

   a.   Save and close any open files, exit any open programs, click the **Start** button, and then click **Shutdown**.

   b.   In the **Shut Down Windows** window, select **Shut down**.

       The computer turns off after the operating system shutdown process finishes.

2. Ensure that the computer and any attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for 4 seconds.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your own personal safety.

 CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide***.**

 CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

 NOTICE: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.

 NOTICE: When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

 NOTICE: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. Turn off your computer. See Turning Off Your Computer.

NOTICE: To disconnect a network cable, first unplug the cable from your computer, and then unplug it from the network port or device.

2. Disconnect any telephone or telecommunication lines from the computer.

3. Disconnect your computer and all attached devices from their electrical outlets, and then press the power button to ground the system board.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

Removing and Installing Parts

Dell™ Dimension™ E521 Service Manual

- Removing the Computer Cover
- Memory
- Cards
- Drive Panel
- Drives
- Hard Drive
- Floppy Drive
- Media Card Reader
- CD/DVD Drive
- Battery
- Power Supply
- Processor
- I/O Panel
- Processor Fan
- System Board
- Installing the Computer Cover

This chapter provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

l   You have performed the steps in Turning Off Your Computer and Before Working Inside Your Computer.

l   You have read the safety information in your Dell™ *Product Information Guide.*

l   A component can be replaced by performing the removal procedure in reverse order.

l   You have the tools listed in Recommended Tools.

Removing the Computer Cover

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the** *Product Information Guide***.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

⚠ **CAUTION: When working inside the computer, be aware that the heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that components have had sufficient time to cool before you touch them.**

🚫 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

🚫 **NOTICE:** Ensure that sufficient space exists to support the removed cover—at least 30 cm (1 ft) of desk top space.

🚫 **NOTICE:** Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2. Lay your computer on its side with the computer cover facing up.

3. Pull back the cover release latch located on the top panel.
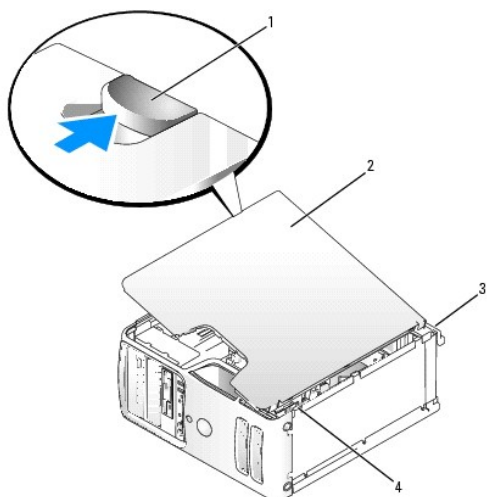
1	cover latch release	2	computer cover	3	back of computer
4	bottom hinge tabs				

4. Locate the three hinge tabs on the bottom edge of the computer.

5. Grip the sides of the computer cover and pivot the cover up, using the bottom hinge tabs as leverage points.

6. Release the cover from the hinge tabs and set it aside in a secure location.

Memory

You can increase your computer memory by installing memory modules on the system board.

Your computer supports DDR2 memory. For additional information on the type of memory supported by your computer, see Memory.

⊘ **NOTICE:** Do not install ECC or buffered memory modules. Only unbuffered, non-ECC memory is supported.

Memory Installation Guidelines

l DIMM connectors must be populated in numerical order beginning with connectors DIMM_1 and DIMM_2, then connectors DIMM_3 and DIMM_4.

   If a single DIMM is installed, you must install it in connector DIMM_1.

l For best performance, memory modules should be installed in *pairs of matched memory size, speed, and technology*. If the memory modules are not installed in matched pairs, the computer will operate, but with a slight reduction in performance. (See the label on the module to determine the module's capacity.) For example, if you install a mixed pair of DDR2 533-MHz and DDR2 667-MHz memory, the modules function at the slowest speed installed.
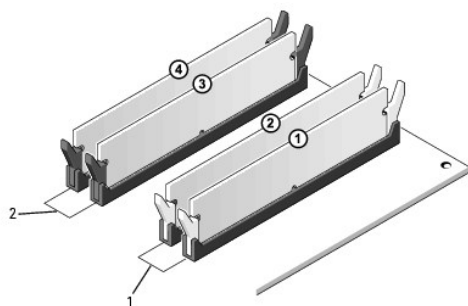
1	Channel A: matched pair of memory modules in connectors DIMM_1 and DIMM_2 (white securing clips)	2	Channel B: matched pair of memory modules in connectors DIMM_3 and DIMM_4 (black securing clips)

NOTICE: If you remove your original memory modules from the computer during a memory upgrade, keep them separate from any new modules that you may have, even if you purchased the new modules from Dell. If possible, do not pair an original memory module with a new memory module. Otherwise, your computer may not start properly. You should install your original memory modules in pairs either in DIMM connectors 1 and 2 or DIMM connectors 3 and 4.

NOTE: Memory purchased from Dell is covered under your computer warranty.

Addressing Memory With 4-GB Configurations

Your computer supports a maximum of 4 GB of memory when you use four 1-GB DIMMs. Current 32-bit operating systems, such as Microsoft® Windows® XP, can use a maximum of 4 GB of address space; however, the amount of memory available to the operating system is less than that installed. Certain components within the computer require address space in the 4-GB range. Any address space reserved for these components cannot be used by computer memory.

Installing Memory

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Press the securing clip at each end of the memory module connector.
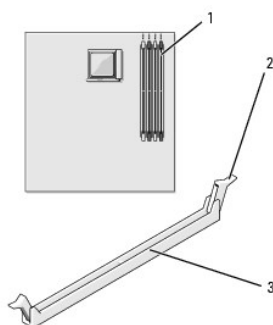
1	memory connector farthest from processor (DIMM_1)	2	securing clips (2)	3	connector

4. Align the notch on the bottom of the module with the crossbar in the connector.
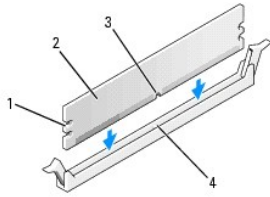
1	cutouts (2)	2	memory module	3	notch
4	crossbar				

🔴 **NOTICE:** To avoid damage to the memory module, press the module straight down into the connector while you apply equal force to each end of the module.

5. Insert the module into the connector until the module snaps into position.

   If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.
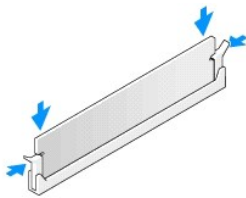
6. Replace the computer cover.

🔴 **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

7. Connect your computer and devices to electrical outlets, and turn them on.

8. Right-click the **My Computer** icon and click **Properties**.

9. Click the **General** tab.

10. To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

Removing Memory

⚠️ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

🔴 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.

2. Press out the securing clip at each end of the memory module connector.

3. Grasp the module and pull up.

Cards

⚠️ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

🔴 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Your Dell™ computer provides the following slots for PCI and PCI Express cards:

  l   One PCI Express x16 card slot (SLOT1)

l One PCI Express x1 card slot (SLOT2

l Two PCI card slots (SLOT3, SLOT4)

See System Board Components for card slot location.

PCI Cards

Your computer supports two PCI cards.

If you are installing or replacing a card, follow the procedures in the next section. If you are removing but not replacing a PCI card, see Removing a PCI Card.

If you are replacing a card, remove the current driver for the card from the operating system.

If you are installing or replacing a PCI Express card, see Installing a PCI Express Card.

Installing a PCI Card

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).
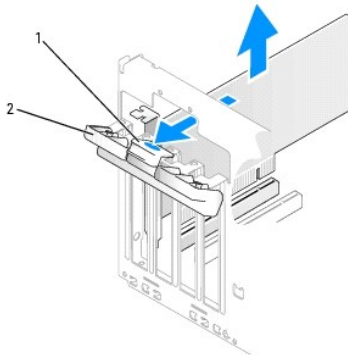
| 1 | release tab | 2 | card retention door |

3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position.

4. If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 6.

5. If you are replacing a card that is already installed in the computer, remove the card.

   If necessary, disconnect any cables connected to the card. Grasp the card by its top corners, and ease it out of its connector.

6. Prepare the card for installation.

   See the documentation that came with the card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

⚠ **CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.**

7. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.
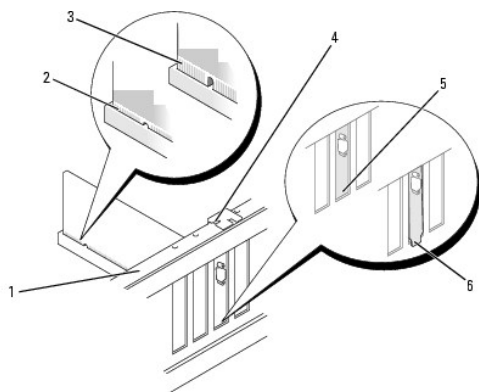
1	alignment bar	2	fully seated card	3	not fully seated card
4	alignment guide	5	bracket within slot	6	bracket caught outside of slot

8. Before you close the card retention door, ensure that:

  l The tops of all cards and filler brackets are flush with the alignment bar.

  l The notch in the top of the card or filler bracket fits around the alignment guide.
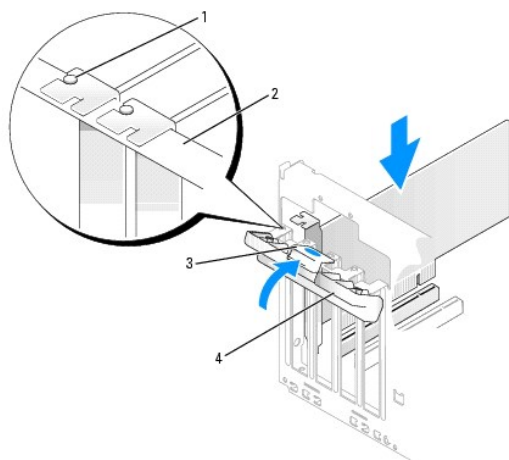
1	alignment guide	2	alignment bar	3	release tab
4	card retention door				

9. Close the card retention door by snapping it into place to secure the cards.

⬤ **NOTICE:** Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10. On a new card, connect any cables that are part of the installation. See the documentation for the card for information about the card's cable connections. On a replacement card, connect any cables that you removed in step 5.

⬤ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

11. Replace the computer cover (see Installing the Computer Cover).

12. Connect your computer and devices to electrical outlets and turn them on.

13. If you installed a sound card:

  a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **Off**.

  b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel.

14. If you installed an add-in network adapter and want to use only the add-in network adapter, then disable the integrated network adapter:

    a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated NIC,** and then change the setting to **Off**.

    b. Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel.

    ✐ **NOTE:** You can use the integrated NIC and add-in NIC adapter at the same time if you have a requirement. In this case, set the **Integrated NIC** setting to **On** and install the driver for the add-in adapter.

15. Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position.
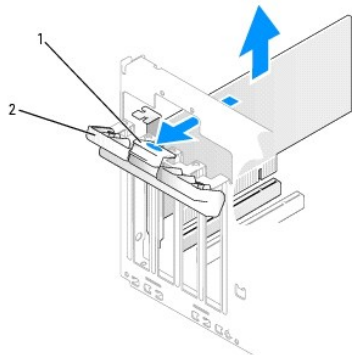
1	release tab	2	card retention door

4. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

    ✐ **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.
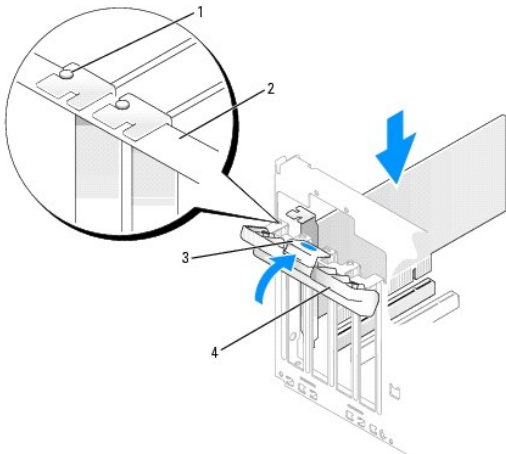
1	alignment guide	2	alignment bar	3	release tab
4	card retention door				

5. Close the card retention door by snapping it into place to secure the cards.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6. Replace the computer cover (see Installing the Computer Cover).

7. Reconnect the computer and devices to electrical outlets, and then turn them on.

8. Remove any drivers required for the card as described in the card documentation.

9. If you removed a sound card:

   a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **On**.

   b. Connect external audio devices to the audio connectors on the back panel of the computer. See Back Panel Connectors.

10. If you removed an add-in network adapter:

    a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated NIC**, and then change the setting to **On**.

    b. Connect the network cable to the integrated connector on the back panel of the computer. See Back Panel Connectors.

PCI Express Cards

Your computer supports one PCI Express x16 card and one PCI Express x1 card.

   l If you are installing or replacing a PCI Express card, follow the procedures in the next section.

   l If you are removing, but not replacing a card, see Removing a PCI Express Card.

   l If you are installing or replacing a PCI card, see Installing a PCI Card.

When replacing the PCI Express Video Card, be aware that the heat sink on the on the card may be very hot during normal operation. Be sure that the heat sink has had sufficient time to cool before you touch the card.

NOTE: If you are replacing a card, remove the current driver for the card from the operating system.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

## Installing a PCI Express Card

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).
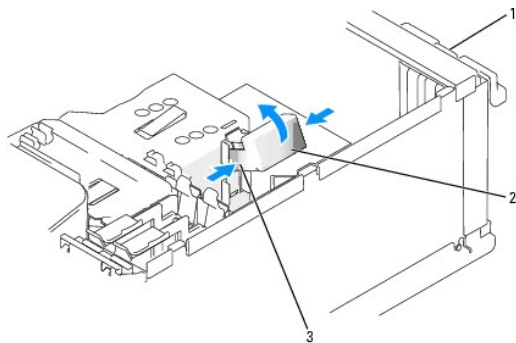
| 1 | card retention door | 2 | card retention mechanism | 3 | release tabs (2) |

3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position (see Installing a PCI Card for an illustration of the card retention door).

4. If your computer includes a card retention mechanism to secure the x16 card in place from the top:

   a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

   b. Set the retention mechanism aside.

5. If you are installing a new card, remove the filler bracket to create a card-slot opening, then continue with step 7.

6. If you are replacing a card that is already installed in the computer, remove the card.

   Disconnect any cables connected to the card. Gently pull the securing tab, grasp the card by its top corners, and then ease it out of its connector.
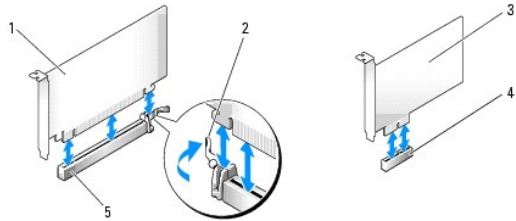
1	PCI Express x16 card	2	securing tab	3	PCI Express x1 card
4	PCI Express x1 card slot	5	PCI Express x16 card slot		

7. Prepare the card for installation.

   See the documentation that came with the card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

⚠ **CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.**

8. If you are installing the card into the PCI Express x16 card connector, position the card so the securing slot is aligned with the securing tab, and gently pull the securing tab.

9. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.
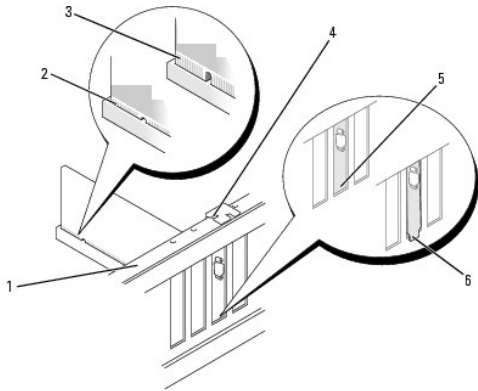
1	alignment bar	2	fully seated card	3	not fully seated card
4	alignment guide	5	bracket within slot	6	bracket caught outside of slot

10. Ensure that:

    l The tops of all cards and filler brackets are flush with the alignment bar.

    l The notch in the top of the card or filler bracket fits around the alignment guide.

11. If previously removed, snap the card retention mechanism into place, securing the x16 PCI card.
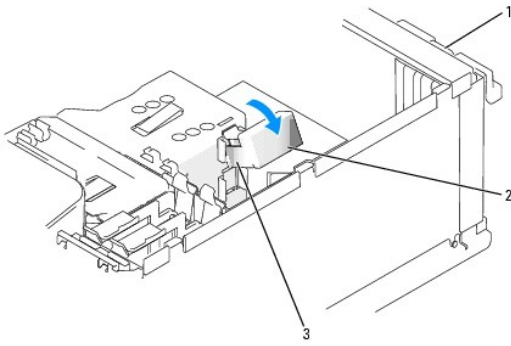
| 1 | card retention door | 2 | card retention mechanism | 3 | release tabs (2) |

⬛ **NOTICE:** Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

⬛ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

12. Replace the computer cover (see Installing the Computer Cover).

13. Reconnect the computer and devices to electrical outlets, and then turn them on.

14. If you installed a sound card:

   a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **Off**.

   b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel.

15. If you installed an add-in network adapter, and want to only use it, then disable the integrated network adapter:

   a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated NIC,** and then change the setting to **Off**.

   b. Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel.

   ✍ **NOTE:** You can use the integrated NIC and add-in NIC adapter at the same time. In this case, set the **Integrated NIC** setting to **On** and install the driver for the add-in adapter.

16. Install any drivers required for the card as described in the card documentation.

Removing a PCI Express Card

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position (see Installing a PCI Card for an illustration of the card retention door).

4. If your computer includes a card retention mechanism to secure the x16 card in place from the top:

   a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

   b. Set the retention mechanism aside.

5. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

   ✍ **NOTE:** Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

6. Reseat the card retention mechanism in the tabs and pivot downward to snap it into place.

7. Close the card retention door to snap it into place, securing the cards.

⬛ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

8. Replace the computer cover (see Installing the Computer Cover).

9. Reconnect the computer and devices to electrical outlets, and then turn them on.

10. Remove any drivers required for the card as described in the card documentation.

11. If you removed a sound card:

    a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **On**.

    b. Connect external audio devices to the audio connectors on the back panel of the computer. See Back Panel Connectors.

12. If you removed an add-in network adapter:

    a. Enter system setup (see System Setup), go to **Onboard Devices** and select **Integrated NIC**, and then change the setting to **On**.

    b. Connect the network cable to the integrated connector on the back panel of the computer. See Back Panel Connectors.

Drive Panel

⚠️ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠️ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

Removing the Drive Panel

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).
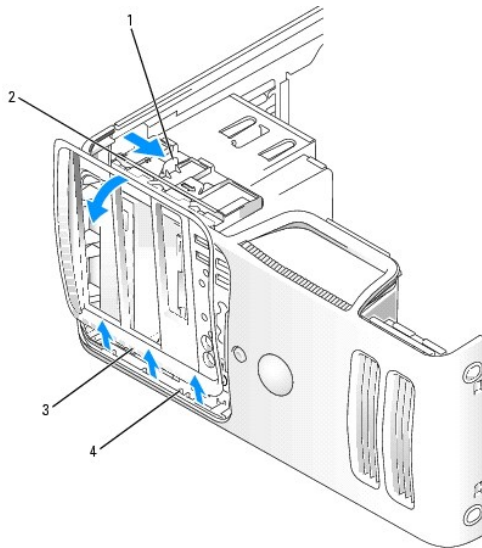
1	sliding plate lever	2	sliding plate	3	drive panel
4	side hinges				

3. Grasping the lever on the sliding plate, pull the sliding plate to the right until it snaps into the open position.

   📝 **NOTE:** This sliding plate secures and releases the drive panel and helps to secure the drives.

4. By pushing from the inside and pivoting the drive panel to the left, you can release the drive panel from its side hinges.

5. Set the drive panel aside.

Removing the Drive-Panel Insert

1	drive panel	2	drive-panel insert tab	3	drive-panel insert
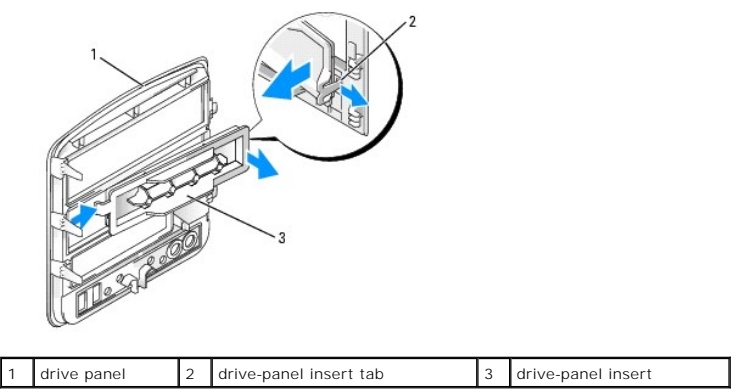
1. Pull the drive-panel insert tab away from the drive panel insert to disengage the insert from the drive panel.

2. Without releasing the tab, pivot the drive-panel insert out and away from the drive panel.

3. Set the drive-panel insert aside in a secure location.

Installing the Drive-Panel Insert

1	center drive-panel tab	2	drive panel	3	drive-panel insert tab
4	drive-panel insert				
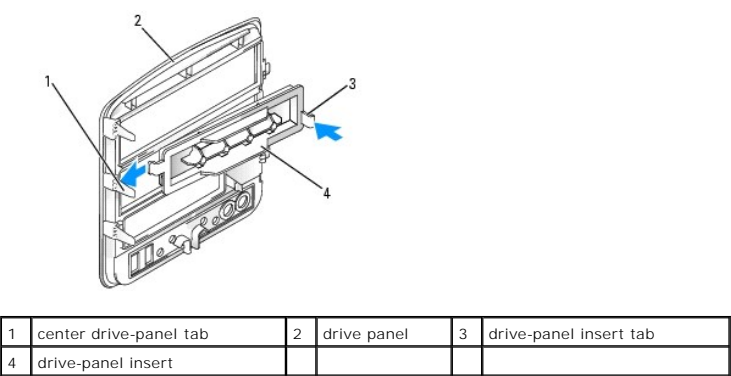
1. Slide the tab on the left side of the drive-panel insert under the center drive-panel tab.

2. Rotate the drive-panel insert into place and snap the drive-panel insert tab over the corresponding tab on the drive panel.

Installing the Drive Panel

1. Follow the procedures in Before You Begin.
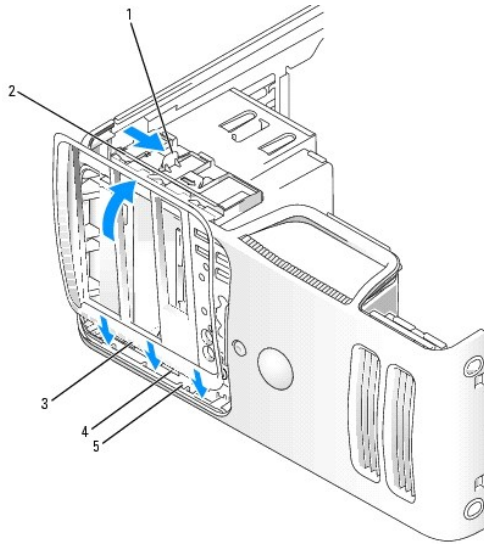
1	sliding plate lever	2	sliding plate	3	drive panel
4	drive panel tabs (3)	5	side hinges		

2. Align the drive panel tabs with the side hinges.

3. Rotate the drive panel toward the computer until it snaps into place on the front panel.

Drives

The computer supports a combination of these devices:

l Up to two serial ATA hard drives

l One optional floppy drive or an optional Media Card Reader

l Up to two CD or DVD drives
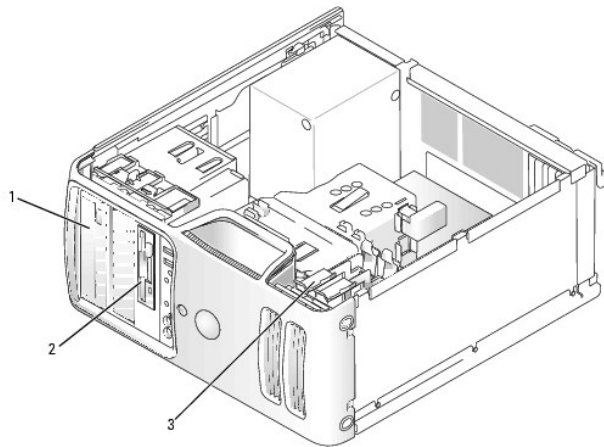
1	CD/DVD drive	2	FlexBay for optional floppy drive or optional Media Card Reader	3	hard drive

Connect serial ATA hard drives to connectors labeled "SATA0" or "SATA1" on the system board.

Connect serial ATA CD or DVD drives to connectors labeled "SATA2" or "SATA3" on the system board. See System Board Components.

Connecting Drive Cables

When you install a drive, you connect a DC power cable and a data cable to the back of the drive.
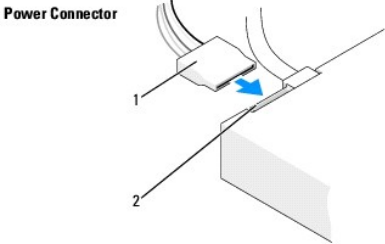
Power Connector

1	power cable	2	power input connector

Drive Interface Connectors

The drive cable connectors are keyed for correct insertion. Properly align the cable connector key on the cable and the drive before connecting.

Serial ATA Connector
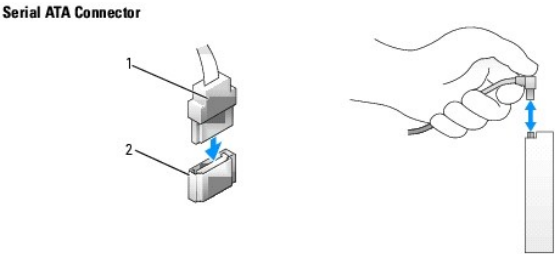
1	interface cable	2	interface connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a serial ATA data cable, disconnect the cable using the pull-tab.
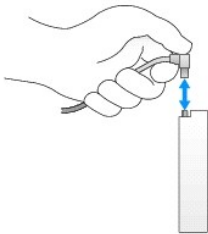
Hard Drive

⚠ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

⚠ CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

🛇 NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

🛇 NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

🛇 NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Check the documentation for the drive to verify that it is configured for your computer.

Removing a Hard Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Disconnect the power and data cables from the drive.

⬤ **NOTICE:** Use the pull-tab to remove the data cable from your hard drive.
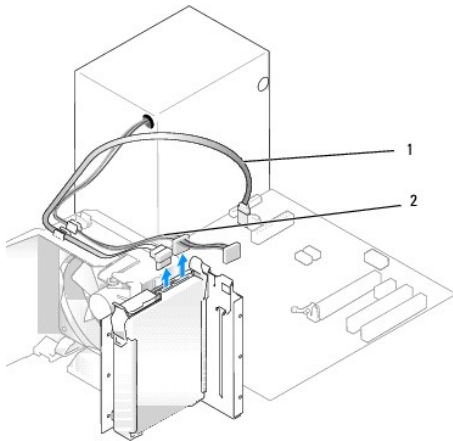
1	serial ATA data cable	2	power cable

4. Press in on the blue tabs on each side of the drive and slide the drive up and out of the computer.
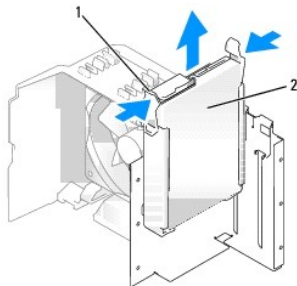
1	tabs (2)	2	hard drive

5. If removing this drive changes the drive configuration, then be sure to reflect these changes in system setup. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the System Setup and under **Drive 0 through 3**, set the Drive to the correct configuration.

6. Replace the computer cover (see Installing the Computer Cover).

7. Connect computer and other devices to an electrical outlet.

Installing a Hard Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Check the documentation for the drive to verify that it is configured for your computer.

✍ **NOTE:** If your replacement hard drive does not have the hard drive bracket attached, remove the bracket from the old drive by unsnapping it from the drive. Snap the bracket onto the new drive.
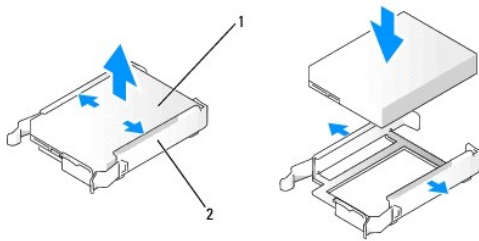
1	drive	2	hard-drive bracket

4. Align the hard drive bracket with the guides in the hard drive bay.
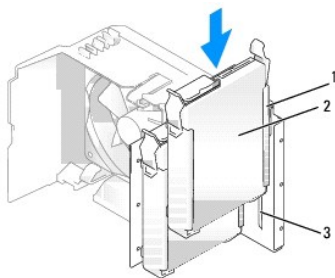
| 1	hard-drive bracket	2	hard drive	3	guide in hard-drive bay

5. Gently slide the drive into place until you feel a click or the drive is securely installed. Take care not to let the drive free-fall into the drive bay.

6. Connect the power and hard-drive cables to the drive (see Connecting Drive Cables).

1	serial ATA data cable	2	power cable

7. Check all cables to be certain that they are properly connected and firmly seated.

8. Replace the computer cover (see Installing the Computer Cover).

🔵 **NOTICE:** To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

9. Connect your computer and devices to electrical outlets, and then turn them on.

   See the documentation that came with the drive for instructions on installing any software required for drive operation.

10. Check the System Setup for drive configuration changes (see Entering System Setup).

Adding a Second Hard Drive

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

🚫 **NOTICE:** To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

1. Check the documentation for the drive to verify that it is configured for your computer.

2. Follow the procedures in Before You Begin.

3. Remove the computer cover (see Removing the Computer Cover).

4. Press in on the blue release tabs on each side of the hard drive bracket and slide it up and out of the computer.

5. Snap the bracket to the hard drive (see Installing a Hard Drive).

6. Align the hard drive bracket with the guides in the hard drive bay.

7. Gently slide the new drive (second hard drive) into place until you feel a click or feel the drive securely installed. Take care not to let the drive free-fall into the drive bay.
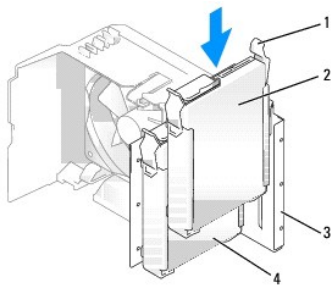
1	release tabs (2)	2	second hard drive in lower bay	3	hard drive bay
4	primary hard drive in upper bay				

8. Connect the power and data cables to the drive (see Connecting Drive Cables).

9. Connect the other end of the data cable to the SATA connector on the system board labeled **SATA0** or **SATA1** (see System Board Components).

10. Check all cables to be certain that they are properly connected and firmly seated.

11. Replace the computer cover (see Installing the Computer Cover).

🚫 **NOTICE:** To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

12. Connect your computer and devices to electrical outlets, and then turn them on.

    See the documentation that came with the drive for instructions on installing any software required for drive operation.

Floppy Drive

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

🚫 **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing a Floppy Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel (see Removing the Drive Panel).
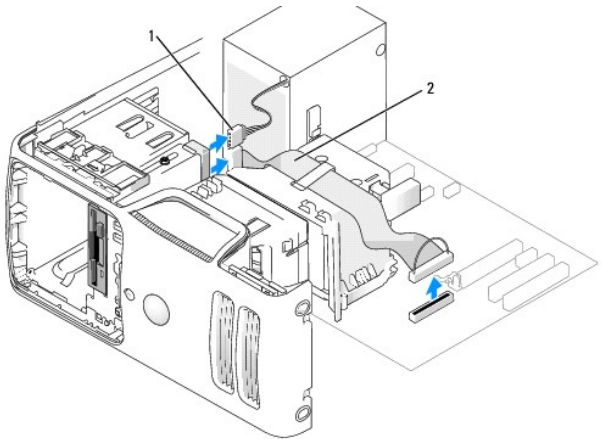
1	power cable	2	data cable

4. Disconnect the power and data cable from the back of the floppy drive. Disconnect the other end of the cable from the floppy connector on the system board (see System Board Components).

5. Remove the data cable from the clip on the processor shroud. Remove the cable from the computer.

6. Slide the drive latch release toward the bottom of the computer, and then slide the floppy drive out through the front of the computer.
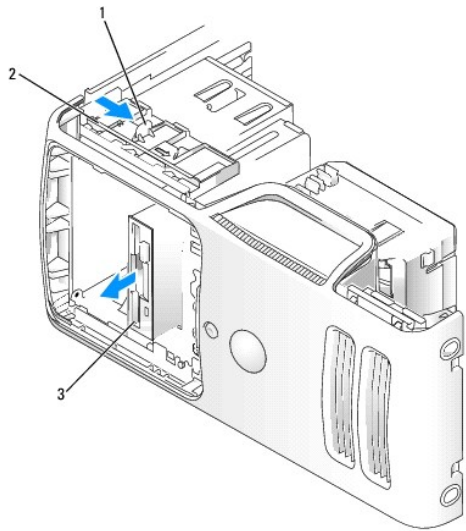
1	drive release latch	2	sliding plate	3	floppy drive

7. If you are not replacing the drive, reinstall the drive panel insert (see Installing the Drive-Panel Insert).

8. Replace the computer cover (see Installing the Computer Cover).

9. Connect your computer and devices to electrical outlets, and then turn them on.

Installing a Floppy Drive

NOTE: In the event that the replacement or new floppy drive does not have shoulder screws, use the shoulder screws located within the drive panel insert. Otherwise, reuse the screws attached to the drive that you are replacing.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel (see Removing the Drive Panel).

4. If this is a new drive installation:

   l Remove the drive panel insert where you want to install the drive (see Removing the Drive-Panel Insert).

   l Remove the four shoulder screws from the drive panel insert.

   l Install two of the shoulder screws on each side of the drive.
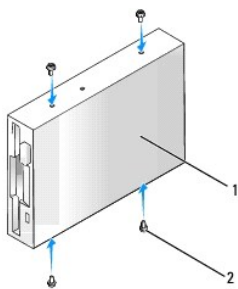
1	floppy drive	2	shoulder screws (4)

5. Gently slide the drive into place until you feel a click or feel the drive securely installed.

6. Attach the power and data cables to the floppy drive.

7. Connect the other end of the data cable to the connector labeled "FLOPPY1" on the system board (see System Board Components) and route the cable through the clip on the processor shroud.
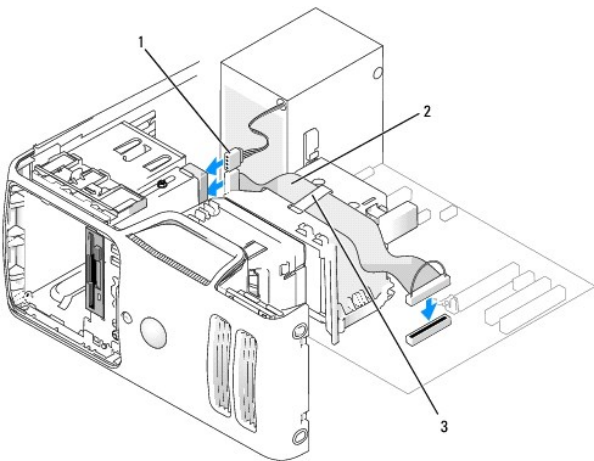
1	power cable	2	data cable	3	processor shroud clip

8. Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents. Insert the floppy data cable into the clip on top of the processor shroud.

9. Replace the drive panel (see Installing the Drive Panel).

10. Replace the computer cover (see Installing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

11. Connect your computer and devices to their electrical outlets, and then turn them on.

   See the documentation that came with the drive for instructions on installing any software required for drive operation.

12. Enter system setup (see System Setup) and select the appropriate **Diskette Drive** option.

13. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Media Card Reader

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing a Media Card Reader

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel (see Removing the Drive Panel).

*Not present on all computers.
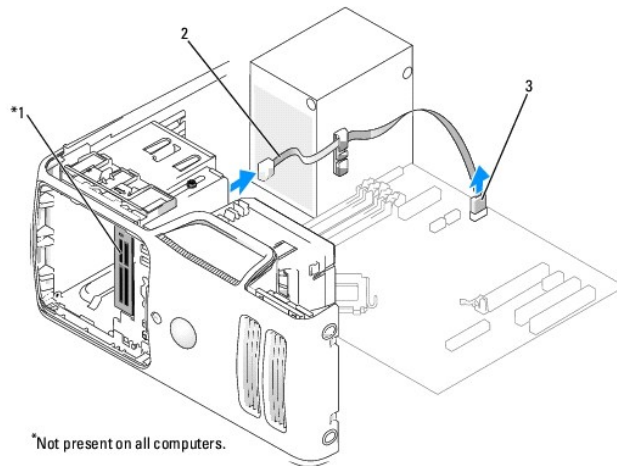
1	Media Card Reader (optional)	2	cable	3	USB connector

4. Disconnect the USB cable from the back of the Media Card Reader. Disconnect the other end of the cable from the USB connector on the system board (see System Board Components). Remove the cable from any clips and lift out of the computer.
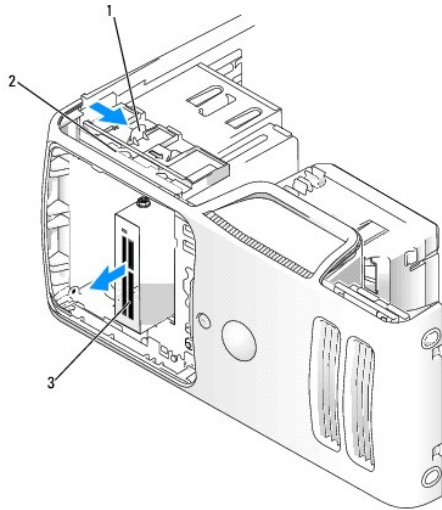
| 1 | drive release latch | 2 | sliding plate | 3 | Media Card Reader |

5. Slide the drive latch release toward the bottom of the computer and, without releasing the drive latch release, slide the Media Card Reader out through the front of the computer.

6. If you are not replacing the Media Card Reader, reinstall the drive panel insert, as needed (see Installing the Drive-Panel Insert).

7. Replace the drive panel (see Installing the Drive Panel).

8. Replace the computer cover (see Installing the Computer Cover).

9. Replace the computer cover (see Installing the Computer Cover).

10. Connect your computer and devices to electrical outlets, and then turn them on.

Installing a Media Card Reader

NOTE: In the event that the replacement or new Media Card Reader does not have shoulder screws, use the screws located within the drive panel insert. Otherwise, reuse the screws attached to the card reader that you are replacing.
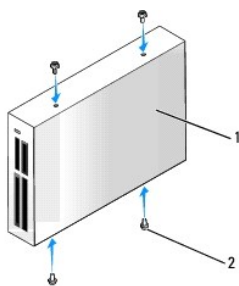
| 1 | Media Card Reader | 2 | screws (4) |

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel (see Removing the Drive Panel).

4. If this is a new card reader installation:

   l   Remove the drive panel insert (see Removing the Drive-Panel Insert). Remove the four shoulder screws from the drive panel insert.

l   Remove the Media Card Reader from its packaging.

l   Remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new Media Card Reader.

5. Gently slide the Media Card Reader into place until you feel a click or feel the drive securely installed.

    Ensure that the Media Card Reader is installed before the FlexBay cable is connected.

6. Connect the USB cable to the back of the Media Card Reader and to the USB connector on the system board (see System Board Components).
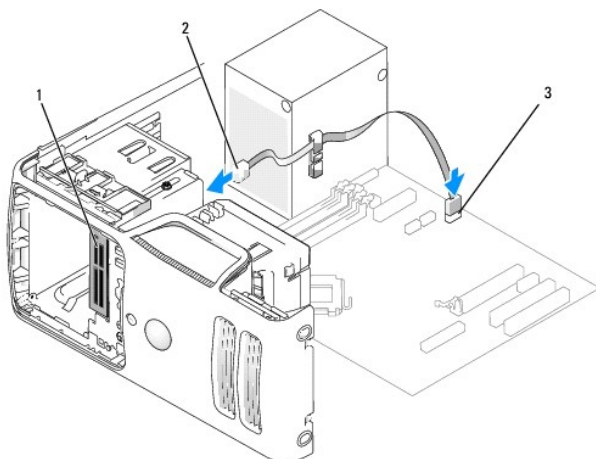
| 1 | Media Card Reader | 2 | USB cable | 3 | USB connector |

7. Route the FlexBay USB cable through the cable routing clip.

8. Replace the computer cover (see Installing the Computer Cover).

9. Connect your computer and devices to electrical outlets, and then turn them on.

CD/DVD Drive

⚠ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

⚠ CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

🚫 NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing a CD/DVD Drive

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove the drive panel (see Removing the Drive Panel).

4. Disconnect the power cable and the CD/DVD drive data cable from the back of the drive and the system board.
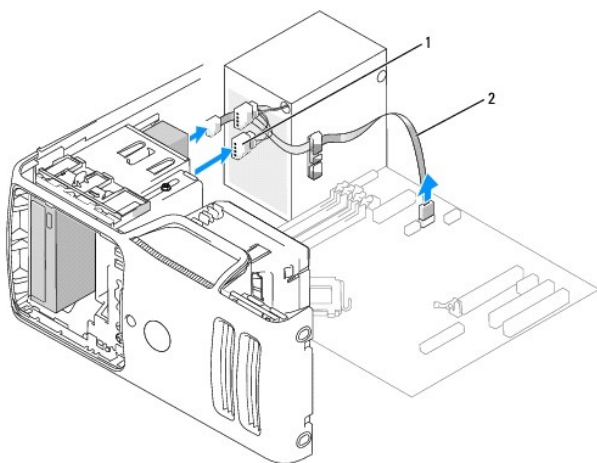
1	power cable	2	data cable

5. Slide the drive latch release toward the bottom of the computer and, without releasing the drive latch release, slide the CD/DVD drive out through the front of the computer.

6. If you are not replacing the drive, replace the drive panel insert (see Installing the Drive-Panel Insert).

7. Replace the drive panel (see Installing the Drive Panel).

1	drive release latch	2	sliding plate	3	CD/DVD drive

8. Replace the computer cover (see Installing the Computer Cover).

9. Connect your computer and devices to electrical outlets, and then turn them on.

10. Configure the drives in System Setup (see Entering System Setup).

Installing a CD/DVD Drive

NOTE: In the event that the replacement or new CD/DVD drive does not have shoulder screws, check for the screws located within the drive panel insert or, if applicable, reuse screws attached to the drive that you are replacing.
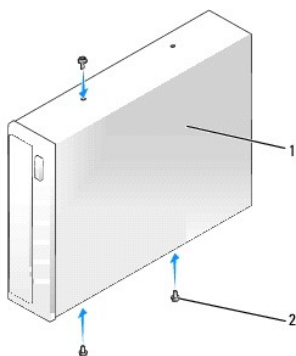
| 1 | CD/DVD drive | 2 | screws (3) |

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. If you are installing a new drive, unpack the drive and prepare it for installation.

   Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

4. If you are installing a new CD/DVD drive rather than replacing a drive, remove the drive panel insert (see Removing the Drive-Panel Insert), then remove three shoulder screws from the inside of the drive- panel insert and attach the screws to the new drive.

5. Slide the drive into the drive bay until the drive clicks into position.

6. Connect the power cable to the drive.

7. Connect the CD/DVD data cable to the drive and to the connector on the system board (see System Board Components).
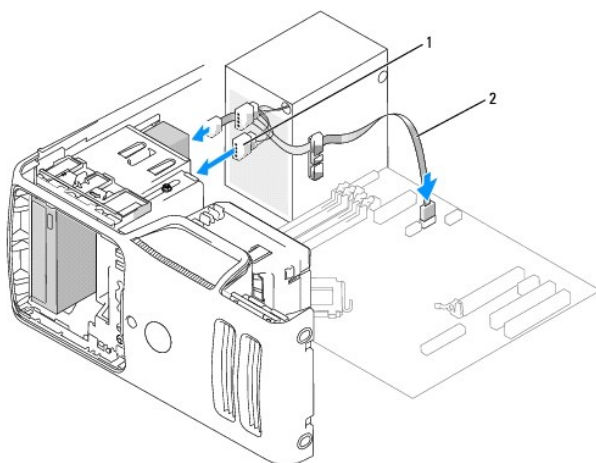
| 1 | power cable | 2 | data cable |

8. Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents.

9. Replace the drive panel (see Installing the Drive Panel).

10. Replace the computer cover (see Installing the Computer Cover).

    ⊖ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

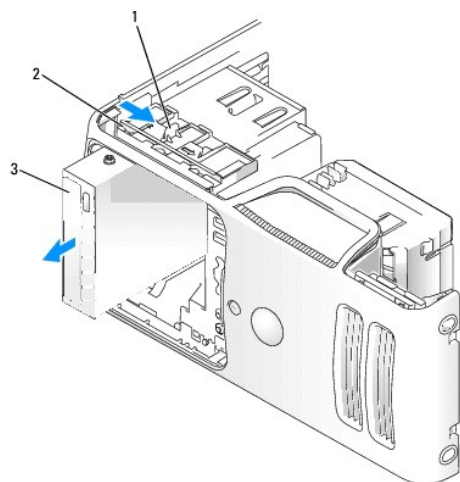11. Connect your computer and devices to their electrical outlets, and then turn them on.

12. When you restart your computer, enter system setup (see System Setup), and select the appropriate **Drive** option.

   See the documentation that came with the drive for instructions on installing any software required for drive operation.

13. Verify that your computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Battery

Replacing the Battery

> ⚠️ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

> ⬤ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years.

If you have to repeatedly reset time and date information after turning on the computer, replace the battery.

> ⚠️ **CAUTION: A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

To replace the battery:

1. Record all the screens in system setup (see System Setup) so that you can restore the correct settings in step 9.

2. Follow the procedures in Before You Begin.

3. Remove the computer cover (see Removing the Computer Cover).

4. Locate the battery socket (see System Board Components).

5. Carefully press the battery release lever away from the battery and the battery will pop out.

6. Insert the new battery into the socket with the side labeled "+" facing up, then snap the battery into place.
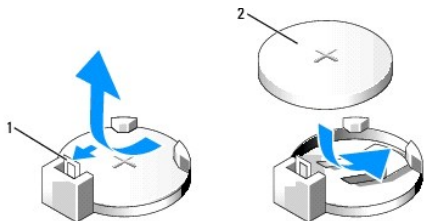
| 1 | battery release lever | 2 | battery (positive side) |

7. Replace the computer cover (see Installing the Computer Cover).

> ⬤ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

8. Connect your computer and devices to electrical outlets, and then turn them on.

9. Enter system setup (see System Setup) and restore the settings you recorded in step 1. Then go to the **Maintenance** section and clear the low battery and other errors associated with the battery replacement in the **Event Log**.

10. Properly dispose of the old battery.

   See the *Product Information Guide* for battery disposal information.

Power Supply

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the** *Product Information Guide.*

⊘ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Replacing the Power Supply

1. Follow the procedures in <u>Before You Begin</u>.

2. Remove the computer cover (see <u>Removing the Computer Cover</u>).

3. Disconnect the DC power cables from the system board and the drives.

   Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Remove the hard drive cable, CD/DVD drive data cable, front panel ribbon cable, and any other cables from the securing clip on the side of the power supply.

5. Remove the four screws that attach the power supply to the back of the computer chassis.

6. Press the release button located on the floor of the computer chassis.
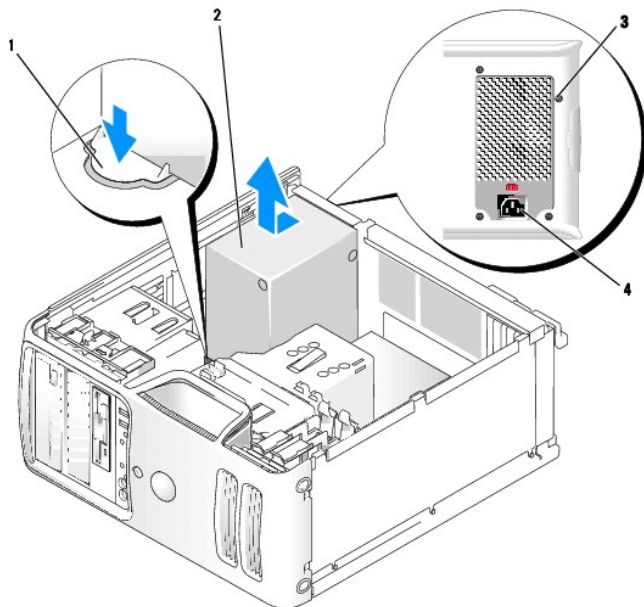
1	release button	2	power supply	3	screws (4)
4	AC power connector				

7. Slide the power supply toward the front of the computer by approximately 1 inch.

8. Lift the power supply up and out of the computer.

9. Lower the replacement power supply into the computer.

10. Slide the power supply toward the back of the computer until the release button snaps into the locking position.

11. Replace the screws that secure the power supply to the back of the computer chassis.

⊘ **NOTICE:** Route the DC power cables under the chassis tabs. The cables must be properly routed to prevent the cables from being damaged.

12. Reconnect the DC power cables to the system board and drives.

13. Secure the hard drive cable, CD/DVD drive data cable, and the front panel ribbon cable to the securing clip on the side of the power supply.

14. Replace the computer cover (see Installing the Computer Cover).

15. Connect your computer and devices to an electrical outlet, and turn them on.

16. Verify that the computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Processor

⚠ CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

⬤ NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Carefully disconnect and move any cables that are routed over the heat sink assembly.

4. If your computer includes a card retention mechanism to secure the x16 card in place from the top:

    a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

    b. Set the retention mechanism aside.

5. Loosen the captive screw on each side of the heat sink assembly.

⚠ CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

⬤ NOTICE: To prevent damage to the processor, press on the heat sink assembly toward the front of the computer to help break the thermal grease bond between the heat sink and the processor.

6. Rotate the heat sink assembly upward, and remove it from the computer.

    Lay the heat sink assembly down on its top, with the thermal grease facing upward.
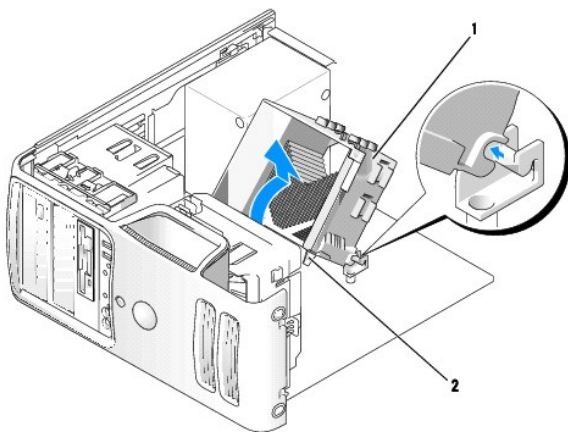
1	heat sink assembly	2	captive screws (2)

⬤ NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

7. Pull the release lever straight up until the processor is released.
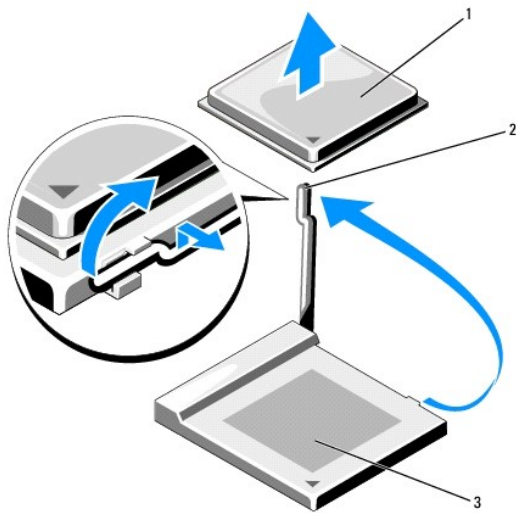
| 1 | processor | 2 | release lever | 3 | socket |

🚫 **NOTICE:** Be careful not to bend any of the pins when you remove the processor. Bending the pins can permanently damage the processor.

8. Remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor and see Installing the Processor.

🚫 **NOTICE:** After removing the processor, be careful not to get any thermal grease on the processor pins. Thermal grease on the pins can permanently damage the processor.

Installing the Processor

🚫 **NOTICE:** Ground yourself by touching an unpainted metal surface on the back of the computer.

1. Follow the procedures in Before You Begin.

🚫 **NOTICE:** Be careful not to bend any of the pins when you unpack the processor. Bending the pins can permanently damage the processor.

2. Unpack the new processor, being careful not to bend any of the processor pins.

   📝 **NOTE:** You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

3. If the release lever on the socket is not fully extended, move it to that position.

4. Align the pin-1 corners of the processor and socket.
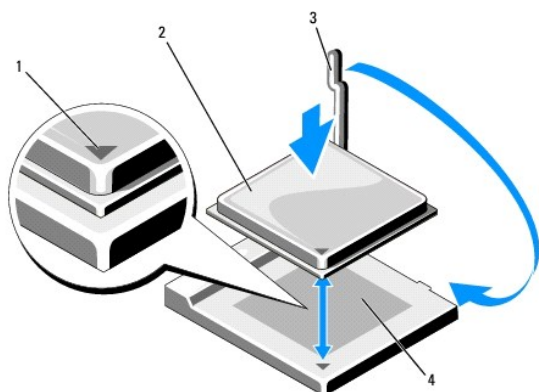
1	processor pin-1 indicator	2	processor	3	release lever
4	socket				

🚫 **NOTICE:** To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

5. Set the processor lightly in the socket and ensure that the processor is positioned correctly.

6. While lightly pressing down on the processor, rotate the release lever back toward the system board until it snaps into place, securing the processor.

7. Clean the thermal grease from the bottom of the heat sink.

🚫 **NOTICE:** Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

8. Apply the new thermal grease to the top of the processor.

🚫 **NOTICE:** Ensure that the floppy drive and audio cables are not routed so that they are pinched when the heat sink assembly is installed.

9. Install the heat sink assembly:
    a. Place the heat sink assembly back onto the heat-sink assembly bracket.
    b. Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board.
    c. Tighten the two captive screws.

🚫 **NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.
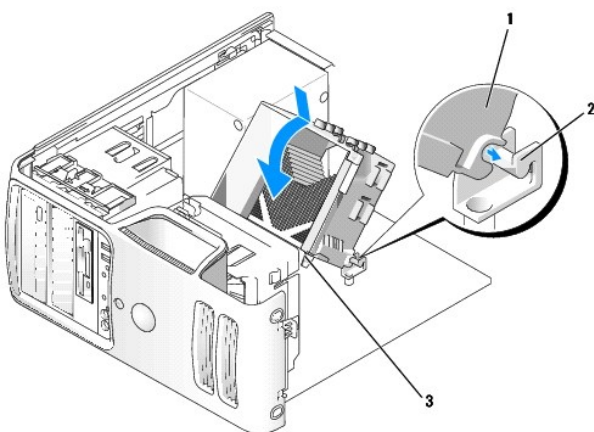
1	heat sink assembly	2	heat sink assembly bracket	3	captive screws (2)

10. If previously removed, snap the card retention mechanism into place, securing the x16 PCI card.

11. Connect any cables disconnected before removing the heat sink assembly.

12. Replace the computer cover (see Installing the Computer Cover).

13. Connect your computer and devices to an electrical outlet, and turn them on.

14. Verify that the computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

I/O Panel

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.**

⚠ **CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.**

⬤ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the I/O Panel

📝 **NOTE:** Note the routing of all cables as you remove them so that you can re-route them correctly when installing the new I/O panel.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

⬤ **NOTICE:** When sliding the I/O panel out of the computer, be extremely careful. Carelessness my result in damage to the cable connectors and the cable routing clips.

3. Remove the screw that secures the I/O panel. Press on the release button and slide the card away from the front of the computer.

4. Carefully remove the panel from the computer.

5. Disconnect all of the cables from the I/O panel.
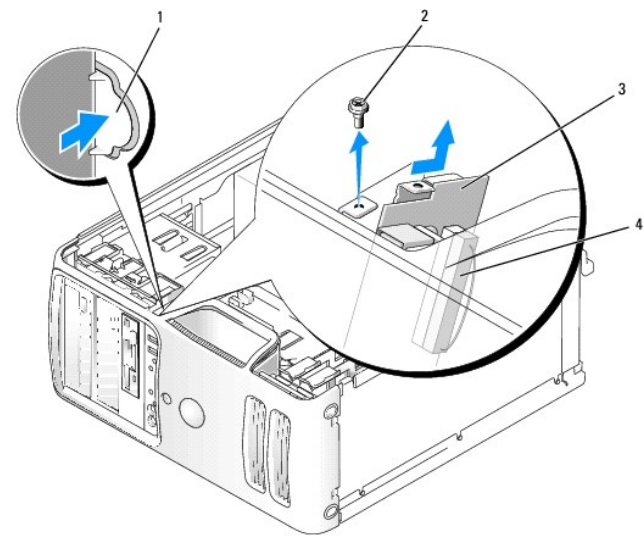
1	I/O panel release button	2	securing screw	3	I/O panel
4	I/O cable connector				

Installing the I/O Panel

1. Reconnect the cables to the I/O panel.

⬤ **NOTICE:** Take care not to damage the cable connectors and the cable routing clips when sliding the I/O panel into the computer.

2. Slide the I/O panel into place using the guides on the I/O panel bracket to help position the I/O panel in place, and use the notch on the I/O panel bracket to help seat the panel. Rotate the panel until the release button is secure.

3. Replace the screw that secures the I/O panel.

4. Replace the computer cover (see Installing the Computer Cover).

5. Connect your computer and devices to an electrical outlet, and turn them on.

6. Verify that the computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Processor Fan

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.**

⚠ **CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.**

⬤ **NOTICE:** To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor Fan

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Carefully disconnect and move any cables that are routed over the heat sink assembly.

4. If your computer includes a card retention mechanism to secure the x16 card in place:

   a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

   b. Set the retention mechanism aside.
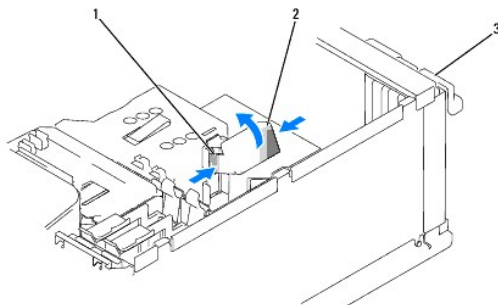
1	release tab	2	card retention mechanism	3	card retention door

5. Loosen the captive screw on each side of the heat sink assembly.

⚠ **CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.**

⬤ **NOTICE:** To prevent damage to the processor, press on the heat sink assembly toward the front of the computer to help break the thermal grease bond between the heat sink and the processor.

6. Rotate the heat sink assembly towards the rear of the computer, and then remove it from the computer.

   Lay the heat sink assembly down on its top, with the thermal grease facing upward.
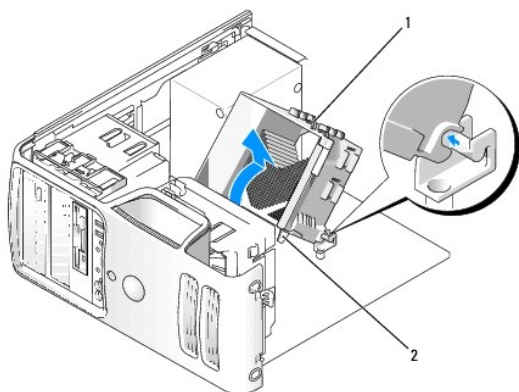
| 1 | heat sink and fan shroud assembly | 2 | captive screw housing (2) |

7. Disconnect the processor fan cable from the system board (see System Board Components).

8. Ensure that all cables have been removed from the routing clips on the top of the processor fan assembly.
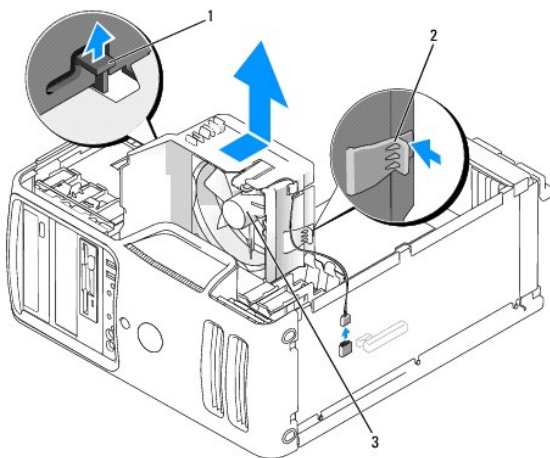
| 1 | fan release lever | 2 | fan release lever tab | 3 | processor fan |

9. The fan has two release levers. One on the side facing the hard disk and a smaller one on the opposite side next to the bottom cover. Release both fan levers, then slide the fan toward the back of the computer to release the four fan tabs from the four slots in the bottom cover.

10. Remove the fan from the computer.

Installing the Processor Fan

When reinstalling the fan, ensure that you do not pinch the wires that run between the system board and the fan.

● **NOTICE:** Ensure that the four fan tabs are fully inserted into the four keyhole slots in the bottom cover so that the fan can slide back fully into position. Ensure that the fan release lever tabs are seated into their respective slots.

1. Place the fan into the computer, aligning the fan assembly to the notches in the bottom of the chassis. Then slide the fan assembly toward the front of the computer. Ensure that the release levers are secure.

2. Replace the cables that were removed from the routing clips on top of the processor fan assembly.

3. Connect the processor fan cable to the system board (see System Board Components).

4. Install the heat sink assembly:

   a. Place the heat sink assembly back onto the heat-sink assembly bracket.

   b. Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board.

   c. Tighten the two captive screws.

⊖ **NOTICE:** Ensure that the heat sink assembly is correctly seated and secure.

5. Replace any cables that were routed over the heat sink assembly.

6. If your computer includes a card retention mechanism, replace it.

7. Replace the cover (see Installing the Computer Cover).

8. Connect your computer and devices to an electrical outlet, and turn them on.

System Board

Removing the System Board

⚠ **CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.**

⚠ **CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.**

⊖ **NOTICE:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

1. Follow the procedures in Before You Begin.

2. Remove the computer cover (see Removing the Computer Cover).

3. Remove any add-in cards on the system board (see Cards).

4. Remove the processor and heat sink assembly (see Processor).

5. Remove the memory modules (see Removing Memory) and document which memory module is removed from each memory socket so that the memory modules can be installed in the same location after the board is replaced.

6. Disconnect all cables from the system board. Note the routing of all cables as you remove them so that you can re-route them correctly after installing the new system board.

7. Remove the six screws from the system board.

8. Remove the two green screws securing the heat sink assembly bracket. Note the orientation of the heat sink assembly bracket as you remove it so that you can properly position the bracket after replacing the system board.

9. Slide the system board assembly toward the front of the computer, and then lift the board up and away.

System Board Screws
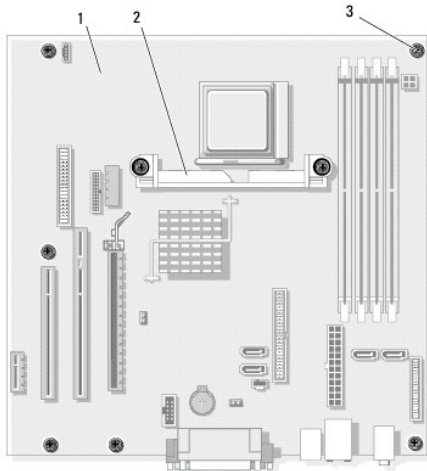
| 1 | system board | 2 | heat sink assembly bracket | 3 | screws (8) |

Place the system board assembly that you just removed next to the replacement system board to ensure it is identical.

Installing the System Board

1. Gently align the board into the chassis and slide it toward the back of the computer.

2. Using the six screws, secure the system board to the chassis.

3. Install the heat sink assembly bracket and secure using the two green screws.

NOTE: The heat sink bracket assembly must be properly oriented to allow proper installation of the heat sink assembly.

4. Replace the cables that you removed from the system board.

5. Replace the memory modules into the memory sockets at the same locations from which you removed them (see Installing Memory).

6. Replace the processor (see Installing the Processor).

7. Install the heat sink assembly:

   a. Place the heat sink assembly back onto the heat-sink assembly bracket.

   b. Rotate the heat sink assembly down towards the computer base and ensure that the two captive screws are properly aligned with the holes in the system board.

   c. Tighten the two captive screws.

NOTICE: Ensure that the heat sink assembly is correctly seated and secure.

8. Replace any add-in cards on the system board.

9. Replace the computer cover (see Installing the Computer Cover).

10. Connect your computer and devices to an electrical outlet, and turn them on.

11. Verify that the computer works correctly by running the Dell Diagnostics (see Dell Diagnostics).

Installing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

1. Ensure that all cables are connected, and fold cables out of the way.

2. Ensure that no tools or extra parts are left inside the computer.

3. Align the bottom of the cover with the tabs located along the bottom edge of the computer.

4. Using the tabs as leverage, rotate the cover downward and press down to close it.
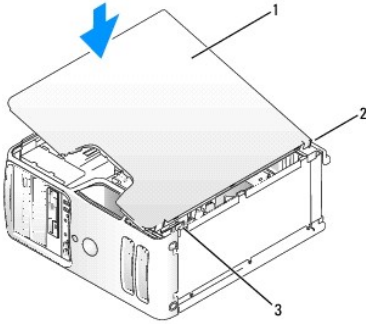
1	computer cover	2	back of computer	3	bottom hinge tabs

5. Ensure that the cover is seated correctly before moving it to the upright position.

🚫 **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6. Connect your computer and devices to electrical outlets, and turn them on.

Dell™ Dimension™ E521 Service Manual

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: **A CAUTION indicates a potential for property damage, personal injury, or death.**

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

Specifications

Dell™ Dimension™ E521 Service Manual

Processor	
Processor type	**AMD Athlon™ 64 X2 dual**-core processor AMD Athlon 64 processor **AMD Sempron™ processor**
Level 2 (L2) cache	Up to 1 MB per core Up to 256 KB for Sempron processors

Memory	
Type	533-MHz, 667-MHz, 800-MHz (when available) DDR2 SDRAM
Memory connectors	four
Memory capacities	**256 MB, 512 MB, or 1 GB non**-ECC
Maximum memory	4 GB **NOTE:** See Addressing Memory With 4-GB Configurations to verify the amount of memory available to the operating system.

Computer Information	
Chipset	Nvidia GeForce 6150LE
RAID Support	RAID 1 (Mirroring)
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	4 Mb
NIC	Integrated network interface capable of 10/100 communication

Video	
Type	Nvidia integrated video (DirectX 9.0 Shader Model 3.0 Graphics Processing Unit) or optional PCI Express x16 graphics card

Audio	
Type	Sigmatel 9227 CODEC (7.1 Channel audio)

Expansion Bus	
Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0 and 2.0 USB 2.0
Bus speed	PCI: 133 MB/s PCI Express: x1 slot bidirectional speed - 500 MB/s x16 slot bidirectional speed - 8 GB/s SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps high speed, 12 Mbps full speed, 1.2 Mbps low speed
PCI	
connectors	two

connector size	124 pins
connector data width (maximum)	32 bits
PCI Express	
connector	one x1
connector size	36 pins
connector data width (maximum)	1 PCI Express lane
PCI Express	
connector	one x16
connector size	164 pins
connector data width (maximum)	16 PCI Express lanes

Drives	
Externally accessible:	
Bays	one 3.5-inch drive bay (FlexBay) two 5.25-inch drive bays
Available devices	Serial ATA drives (4), floppy drive, USB memory devices, CD/DVD drive, and Media Card Reader
Internally accessible:	two bays for 1-inch high serial ATA hard drives

Connectors	
External connectors:	
Video	15-hole connector
Network adapter	RJ-45 connector
USB	two front-panel and four back-panel USB 2.0-compliant connectors
Audio	six connectors for 7.1 support
System board connectors:	
Serial ATA	four 7-pin connectors
Internal USB device	one 10-pin connector (supports two USB ports)
Floppy drive	one 34-pin connector
Fan	one 5-pin connectors
PCI 2.3	two 124-pin connectors
PCI Express x1	one 36-pin connector
PCI Express x16	one 164-pin connector
Front panel	one 40-pin connector
Processor	one 940-pin connector
Memory	four 240-pin connectors
Power 12V	one 4-pin connector
Power	one 24-pin connector

Controls and Lights	
Front of computer:	
Power button	push button
Power light	green light — Blinking green in sleep state; solid green for power-on state. amber light — Blinking amber indicates a problem with the power supply inside the computer. If the system cannot boot and there is a solid amber light, this indicates a problem with the system board (see "Power Problems" in your *Owner's Manual*).
Diagnostic lights	four lights on the front panel (see Diagnostic Lights.)
Standby power light	AUX_PWR_LED on the system board
Hard-drive activity light	green light — When the computer is reading data from or writing data to the hard drive.
LAN indicator light	green light — Solid green indicates that a LAN (local area network) connection is established.
Rear of computer:	
Link integrity light (on integrated network adapter)	green light — A good connection exists between a 10 Mbps network and the computer.

	orange light — A good connection exists between a 100 Mbps network and the computer. off (no light) — The computer is not detecting a physical connection to the network.
Network activity light (on integrated network adapter)	yellow blinking light

Power	
DC power supply:	
Wattage	305 W
Maximum heat dissipation	1041 BTU/hr **NOTE:** Heat dissipation is calculated by using the power supply wattage rating.
Voltage (see the safety instructions located in the *Product Information Guide* for important voltage setting information)	90 to 135 V and 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	41.4 cm (16.3 inches)
Width	18.8 cm (7.4 inches)
Depth	45.7 cm (18.0 inches)
Weight	12.7 kg (28.0 lb)

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	−40° to 65°C (−40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	5 to 350 Hz at 0.0002 G^2/Hz
Storage	5 to 500 Hz at 0.001 to 0.01 G^2/Hz
Maximum shock:	
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 20 in/sec [51 cm/sec])
Storage	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 50 in/sec [127 cm/sec])
Altitude:	
Operating	−15.2 to 3048 m (−50 to 10,000 ft)
Storage	−15.2 to 10,668 m (−50 to 35,000 ft)

System Setup

Dell™ Dimension™ E521 Service Manual

- Overview
- Entering System Setup
- System Setup Options
- Boot Sequence
- Clearing Forgotten Passwords
- Clearing CMOS Settings
- Flashing the BIOS

Overview

Use system setup as follows:

- To change the system configuration information after you add, change, or remove any hardware in your computer

- To set or change a user-selectable option, such as the user password

- To read the current amount of memory or set the type of hard drive installed

Before you use system setup, it is recommended that you write down the system setup screen information for future reference.

🚫 **NOTICE:** Do not change the settings in system setup unless you are an expert computer user. Certain changes can cause your computer to work incorrectly.

Entering System Setup

1. Turn on (or restart) your computer.

2. When the DELL logo appears, press <F2> immediately.

   📝 **NOTE:** Keyboard failure may result when a key on the keyboard is held down for extended periods of time. To avoid possible keyboard failure, press and release <F2> in even intervals until the system setup screen appears.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, then shut down your computer and try again.

System Setup Screen

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into four areas: the menu at the top, the main window, the Item Help field on the right, and key functions listed on the bottom.

Options List — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features. Scroll up and down the list by using the up and down arrow keys. As an option is highlighted, the **Option Field** displays more information about that option and the option's current and available settings.	**Option Field** — This field contains information about each option. In this field you can view your current settings and make changes to your settings. Use the right- and left-arrow keys to highlight an option. Press <Enter> to make that selection active.
	Key Functions — This field appears below the **Option Field** and lists keys and their functions within the active system setup field.

System Setup Options

📝 **NOTE:** Depending on your computer and installed devices, the items listed in this section may not appear, or may not appear exactly as listed.

System	
System Info	Displays the **System** name, **BIOS Version**, **Service Tag, Express Service Code**, and **Asset Tag**. **NOTE:** The system name listed in the BIOS may not appear exactly as the name that appears on the computer or in the computer's documentation.
Processor Info	Displays the following information for the processor installed in the system: **Processor Type**, **Processor Clock Speed**, **Processor Bus Speed**, **Processor L2 Cache**, **Processor ID**, and if the processor has **64-bit technology**.
Memory Info	Displays the amount of **Installed Memory**, **Memory Speed**, **Memory Channel Mode**, and a description of the **Memory Technology**.
PCI Info	Displays the contents of each PCI slot.
Date/Time	Controls the system's internal calendar and clock.
Boot Sequence	Determines the order in which the system searches for boot devices during system startup. **NOTE:** If you insert a boot device and restart the computer, this option appears in the system setup menu. To boot from a USB memory device, select the USB device and move it so it becomes the first device in the list.
HDD Boot Sequence	Lists the order that the BIOS will search the available hard drives in the system.

Drives	

Diskette Drive
 	
(**Internal** default)
	Enables and disables the floppy drives and sets read permission for the internal floppy drive.
	
	  l **Off** — disables all floppy drives
	  l **USB** — enables the USB floppy drive
	  l **Internal —** enables the internal floppy drive
	  l **Read Only —** enables the internal drive controller and allows the internal floppy drive read-only permission
	
	NOTE: Operating systems with USB support will recognize USB floppy drives regardless of this setting.

Drives 0 through 3 (**On** default)	Enables or disables an ATA or SATA device (such as hard-drive, CD drive, or DVD drive). **On** enables the interface so that the device can be used. Displays the **Controller** type (**ATA** or **SATA**), **Port** number the drive is using, **Drive ID** number, **Capacity**, and whether the drive is controlled by the **BIOS**.

SATA Operation
 	
(**Off** default)
	The field configures the operating mode of the integrated hard drive controller.
	
	  l **RAID Off** — No RAID support
	  l **RAID On** — SATA is configured for RAID on every boot.

SMART Reporting (**Off** default)	This setting determines whether integrated drive errors are reported or not during system startup.

Onboard Devices	
Integrated NIC (**On** default)	Enables or disables the integrated NIC controller. Settings are **Off**, **On**, **On w/ PXE, or On w/RPL**. When the **On w/ PXE** or the **On w/RPL** setting is active, if a boot routine is not available from the network server, the computer attempts to boot from the next device in the boot sequence list.
Integrated Audio (**On** default)	Enables or disables the onboard audio controller.
USB Controller (**On** default)	Enables or disables the internal USB controller. **No Boot** enables the controller but disables the ability to boot from a USB device. **NOTE:** Operating systems with USB support will recognize USB floppy drives regardless of the **No Boot** setting.
Rear Dual USB0 (**On** default)	Enables or disables the indicated group of USB ports on the back of the computer.
Rear Dual USB1 (**On** default)	Enables or disables the indicated group of USB ports on the back of the computer.
Front USB	Enables or disables the indicated group of USB ports on the front of the computer.

(**On** default)	

Video	
Primary Video (**Auto** default)	Specifies which video controller is primary when two video controllers are present on the computer. **Auto** enables the add-in video controller. **Onboard** enables the integrated video controller.
Video Memory Size (**64MB** default)	This setting configures the amount of system memory that is reserved for the integrated video controller. The settings are Auto, 16MB, 32MB, 64MB, 128MB, or Off.

Performance	
HDD Acoustic Mode **Bypass** is default	l **Bypass** — Your computer does not test or change the current acoustics mode setting. l **Quiet** — The hard drive operates at its most quiet setting. l **Suggested** — The hard drive operates at the level suggested by the drive manufacturer. l **Performance** — The hard drive operates at its maximum speed. **NOTE:** Switching to performance mode will cause the drive heads to move faster, causing the hard drive to be noisier. However, some drives may not see an increase in data transfer rates. **NOTE:** Changing the acoustics setting does not alter your hard drive image.

Security	
Unlock Setup	When an administrator password is being used, allows the user access to modify system setup settings. Enter the administrator password at the prompt to unlock system setup. If the correct password is not entered here, the user can view but not modify system setup fields.
Admin Password (**Not Set** default)	Displays the current status of your system setup program's password security feature and allows you to verify and assign a new admin password.
System Password (**Not Set** default)	Displays the current status of the system's password security feature and allows a new system password to be assigned and verified.
Password Changes (**Unlocked** default)	Determines the interaction between the **System** password and the **Admin** password. **Locked** prevents a user without a valid **Admin** password from being able to modify the **System** password. **Unlocked** allows a user with a valid **System** password to modify the system password.
No-Execute (**On** default)	Enables or disables Execute Disable memory protection technology.

Power Management	
AC Recovery (**Off** default)	Determines how the system responds when AC power is re-applied after a power loss. l **Off** — The system remains off when power is re-applied. You must press the front-panel power button before the system turns on. l **On** — The system turns on when power is re-applied. l **Last** — The system returns to the last power state the system was in just before it was turned off.
Auto Power On (**Off** default)	Sets the computer to automatically turn on. l **Off** — disables the Auto Power On feature l **Everyday** — turns the computer on every day at the time set in **Auto Power Time** l **Weekdays** — turns the computer on every day from Monday through Friday at the time set in **Auto Power Time** **NOTE:** This feature does not work if you turn off your computer using a power strip or surge protector.
Auto Power Time	Sets time to automatically turn on the computer. Time is kept in the standard 12-hour format (*hours:minutes*). Change the startup time by pressing the right- or left-arrow key to increase or decrease the numbers, or type numbers in both the date and time fields.
Low Power Mode (**Off** default)	When **Low Power Mode** is selected, remote wakeup events will no longer power up the computer from **Hibernate** or **Off** via the onboard network controller.
Cool and Quiet (**On** default)	This option enables or disables the Cool 'n' Quiet technology for all supported processors
Suspend Mode	Sets the computer's suspend mode.

(S3 default)	l **S1 —** sets the computer to a suspend state where the computer is running in a low-power mode l **S3 —** sets the computer to a standby state where the power is reduced or turned off for most components; however, system memory remains active for both settings

Maintenance	
Service Tag	Displays the service tag for your computer.
Load Defaults	Restores system setup options to their factory defaults.
Event Log	Allows you to view the **Event Log**. Entries are marked **R** for **Read** and **U** for **Unread**. **Mark All Entries Read** puts an R to the left of all entries. **Clear Log** clears the **Event Log**.

POST Behavior	
Fast Boot (**On** default)	When enabled, this feature reduces computer startup time by bypassing some compatibility steps. l **Off —** does not skip any steps during computer startup l **On —** starts the system more quickly
Numlock Key (**On** default)	Determines the functionality of the numeric keys on the right side of your keyboard. l **Off —** commands the right keypad keys to function as arrows l **On —** commands the right keypad keys to function as numbers
POST Hotkeys (**Setup & Boot Menu** default)	Determines whether the sign-on screen displays a message stating the keystroke sequence that is required to enter the **Setup** program or the **Quickboot** feature. l **Setup & Boot Menu —** displays both messages (F2=Setup and F12=Boot Menu) l **Setup —** displays the setup message only (F2=Setup) l **Boot Menu —** displays the **Quickboot** message only (F12=Boot Menu) l **None —** displays no message
Keyboard Errors (**Report** default)	When set to **Report** and an error is detected during POST, the BIOS will display the error message and prompt you to press <F1> to continue or press <F2> to enter system setup. When set to **Do Not Report** (disabled) and an error is detected during POST, the BIOS will display the error message and continue booting the system.

Boot Sequence

This feature allows you to set the order in which the BIOS will search devices when trying to find an operating system.

NOTICE: If you modify any boot sequence settings, save the new settings to avoid losing the changes.

Option Settings

NOTE: The computer attempts to boot from all bootable devices, but if no bootable device is found, the computer generates an error message that states No boot device available. Press the <F1> key to retry the boot, or press the <F2> key to enter the setup utility.

l **Bootable Hard Drive —** The computer attempts to boot from the primary hard drive. If no operating system is on the drive, the computer generates an error message.

l **Onboard Floppy Drive —** The computer attempts to boot from the floppy drive. If the floppy disk in the drive is not bootable, if no floppy disk is in the drive, or if there is no floppy drive installed in the computer, the computer generates an error message.

l **Onboard CD-ROM Drive —** The computer attempts to boot from the CD drive. If no CD is in the drive, or if the CD has no operating system, the computer generates an error message.

l **Integrated NIC —** The computer attempts to boot using the integrated NIC. If integrated NIC is not connected, the computer generates an error message.

l **USB-Device, USB-Floppy, USB-CDROM —** Attach the device to a USB port and restart the computer before selecting the option from the Boot Menu. The computer will attempt to boot from the appropriate USB device. If no operating system is on the appropriate drive or disk, the computer will generate an error message.

NOTE: To boot to a USB device, the device must be bootable. To ensure that a device is bootable, check the device documentation.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to restart your computer to a USB device, such as a floppy drive, memory key, CD-RW drive, or PXE (NIC).

NOTE: If you are booting to a USB floppy drive, you must first set the floppy drive to OFF in system setup (see System Setup Options).

1. If you are booting to a USB device, connect the USB device to a USB connector (see Front View of the Computer).

2. Turn on (or restart) your computer.

3. When `F2 = Setup, F12 = Boot Menu` appears in the upper-right corner of the screen, press <F12>.

   ![note icon] **NOTE:** Keyboard failure may result when a key on the keyboard is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals until the **Boot Device Menu** appears.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.

4. Press <F1> to continue.

   The **Boot Menu** appears, listing all available boot devices.

5. Use the arrow keys to select the appropriate device (for the current boot only).

![note icon] **NOTE:** To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Changing Boot Sequence for Future Boots

1. Enter system setup, select **Boot Sequence** from the **System** group (see Entering System Setup).

2. Press <Enter> to access the menu.

   ![note icon] **NOTE:** Write down your current boot sequence in case you want to restore it.

3. Press the up- and down-arrow keys to highlight the appropriate **Boot Sequence** option.

4. Press the **U** or **D** keys to move the option **up** or **down** in the boot sequence.

5. Press <Enter> to **Save** the changes or <Esc> to **Cancel**.

![note icon] **NOTE:** To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Clearing Forgotten Passwords

![caution icon] **CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

1. Follow the procedures in Before Working Inside Your Computer.

2. Remove the computer cover (see Removing the Computer Cover).
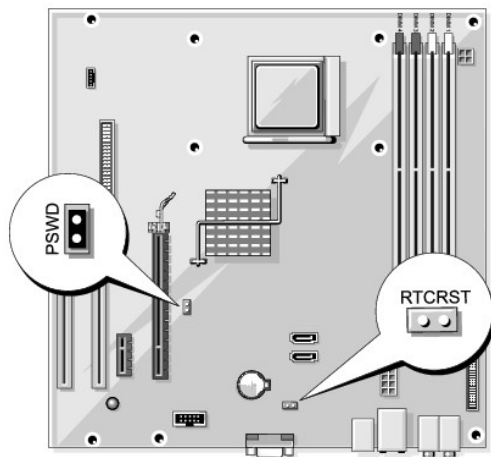
3. Locate the 2-pin password jumper (PSWD) on the system board (see System Board Components), and remove the jumper to clear the password.

    📝 **NOTE:** When you receive your computer, the jumper plug is attached to pins 1 and 2.

4. Replace the computer cover (see Installing the Computer Cover).

5. Connect your computer and monitor to electrical outlets, and then turn them on.

6. After the Microsoft® Windows® desktop appears on your computer, shut down the computer (see Turning Off Your Computer).

7. Turn off the monitor and disconnect it from the electrical outlet.

8. Disconnect the computer power cable from the electrical outlet, then press the power button to ground the system board.

9. Remove the computer cover (see Removing the Computer Cover).

10. Locate the 2-pin password jumper (PSWD) on the system board (see System Board Components) and attach the jumper to pins 1 and 2 to re-enable the password feature.

11. Replace the computer cover (see Installing the Computer Cover).

⬛ **NOTICE:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

12. Connect your computer and devices to electrical outlets, and then turn them on.

Clearing CMOS Settings

⚠️ **CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

1. Follow the procedures in Before Working Inside Your Computer.

2. Remove the computer cover (see Removing the Computer Cover).

📝 **NOTE:** The computer must be disconnected from the electrical outlet to clear the CMOS setting.

3. Reset the current CMOS settings:

    a. Locate the 2-pin CMOS jumper (RTCRST) on the system board (see System Board Components).

    📝 **NOTE:** When you receive your computer, there is no jumper plug on the CMOS jumper.

    b. Remove the jumper plug from the password jumper (PSWD) pins 1 and 2.

    c. Place the jumper plug on the CMOS jumper (RTCRST) pins 1 and 2 and wait approximately five seconds.

    d. Remove the jumper plug and replace it on the password jumper (PSWD) pins 1 and 2.

4. Replace the computer cover (see Installing the Computer Cover).

⬛ **NOTICE:** To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

5. Connect your computer and devices to electrical outlets, and then turn them on.

Flashing the BIOS

The BIOS may require flashing when an update is available or when replacing the system board.

1. Turn on the computer.

2. Locate the BIOS update file for your computer at **support.dell.com**.

3. Click **Download Now** to download the file.

4. If the **Export Compliance Disclaimer** window appears, click **Yes, I Accept this Agreement**.

    The **File Download** window appears.

5. Click **Save this program to disk**, and then click **OK**.

    The **Save In** window appears.

6. Click the down arrow to view the **Save In** menu, select **Desktop**, and then click **Save**.

    The file downloads to your desktop.

7. Click Close when the **Download Complete** window appears.

    The file icon appears on your desktop and is titled the same as the download BIOS update file.

8. Double-click the file icon on the desktop and follow the on-screen instructions.
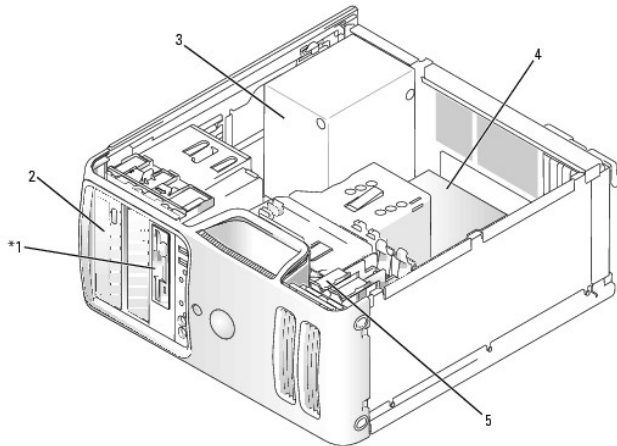

Technical Overview
Dell™ Dimension™ E521 Service Manual

- Inside View of Your Computer
- System Board Components
- Power Supply DC Connector Pin Assignments

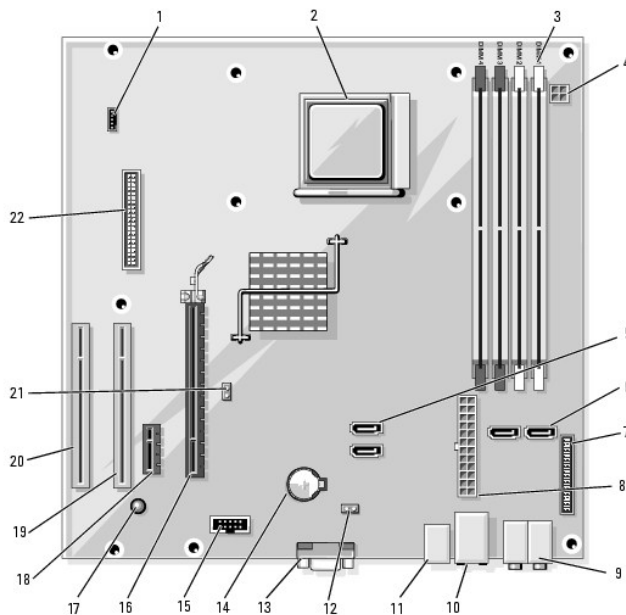## Inside View of Your Computer

*May not be present on all computers.

1	floppy drive or Media Card Reader	2	CD or DVD drive	3	power supply
4	system board	5	hard drive		

System Board Components

1	fan connector (FAN_CPU1)	2	processor socket (CPU)	3	memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)
4	power connector (PW_12V_A1)	5	serial ATA drive connectors (SATA2, SATA3)	6	serial ATA drive connectors (SATA0, SATA1)
7	front-panel connector (FRONTPANEL)	8	power connector (POWER1)	9	line-in, line-out, microphone, side surround, center, and LFE connectors (AUDIO_6_STACK)
10	USB connectors (2) (USB2_BACK1)	11	network connector and USB connectors (2) (NIC_USB1)	12	real-time clock reset jumper (RTCRST)
13	video connector (VIDEO1)	14	battery socket (BT1)	15	Internal USB connector (USB1)
16	PCI Express x16 connector (SLOT1)	17	standby power indicator (AUX_PWR_LED)	18	PCI Express x1 connector (SLOT2)
19	PCI connector (SLOT3)	20	PCI connector (SLOT4)	21	password jumper (PSWD)
22	floppy drive connector (FLOPPY1)				

Power Supply DC Connector Pin Assignments
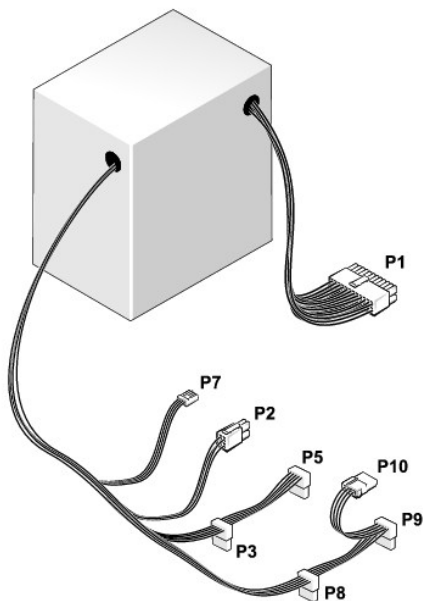
DC Power Connector P1
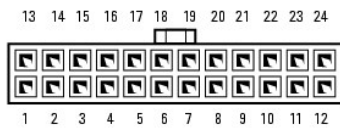
Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black
4	+5 VDC	Red
5	GND	Black
6	+5 VDC	Red

7	GND	Black
8	PS_PWRGOOD	Gray
9	P5AUX	Purple
10	V_12P0_DIG	White
11	V_12P0_DIG	White
12	+3.3 VDC	Orange
13	+3.3VDC/SE*	Orange
14	-12 VDC	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	+5 VDC	Red
22	+5 VDC	Red
23	+5 VDC	Red
24	GND	Black

DC Power Connector P2

Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VADC	Yellow
4	+12 VADC	Yellow

DC Power Connectors P3, P5, P8, and P9

Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red
4	GND	Black
5	+12 VBDC	White

DC Power Connector P7
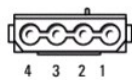
Pin Number	Signal Name	22-AWG Wire
1	+5 VDC	Red
2	GND	Black
3	GND	Black
4	+12 VADC	Yellow

DC Power Connector P10

4 3 2 1
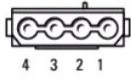
Pin Number	Signal name	18-AWG Wire
1	+12 VBDC	White
2	GND	Black
3	GND	Black
4	+5 VDC	Red